

Start Racing!

CAR ACTION'S exclusive

COMPETITION GUIDE

WHICH CLASS IS RIGHT FOR YOU? Page 68

Radio Control CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

September 1995

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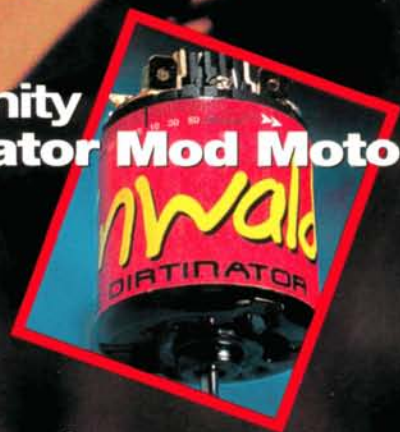
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ON THE COVER: photo by John Howell.
This page: photo by Frank Masi.

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EDITORIAL

I'M AN R/C poser! Well, actually, I'm not really a poser, but I sort of feel like one every once in a while. Let me explain why. I've been involved in this hobby for more than 10 years now, and I've been involved with the magazine for a little more than three years. I've driven, worked on and know the ins and outs of just about every type of R/C car and truck you can think of and, basically, I get a big kick out of being involved in this awesome hobby.



Getting on the Right Track

Now, getting back to my original point: here's why I feel as if I'm a poser of sorts. I've never ever officially raced an R/C car. Sure, I've bashed around an off-road track or two with some friends, and I've even messed around with some fairly relaxed parking-lot racing, but I've never walked the walk to the drivers' stand and heard a starter's voice chime out, "Less than five, drivers." And you wanna know why? It's plain and simple: I've been afraid to race. I mean, c'mon, have you ever been to a race? It can be a pretty intense scene! I'm sure all you diehard racers are laughing to yourselves right now, and I totally understand why. It's a pretty stupid hang-up, and it's one I have to get over.

I'm taking steps toward conquering this whole racing thing. Here's why: our computer systems manager, Gordon Oppenheimer, who is a really nice guy, one day decided that he wanted to give the R/C hobby a shot. We styled him out with an entry-level race truck—Associated's RC10ST. He wrote the "Thrash Test" on it in our March '95 issue. Gordon did a pretty good job of putting the car together without much help from us, and because it was his first ever R/C car, he did the things we all did with our first cars: drove on the street, jumped curbs, did donuts; remember all that stuff?

Anyway, shortly after Gordon had the truck up and running, he came into our office and told us that he wanted to race it. I was really impressed. Frank Masi took Gordon to his first race, and he totally loved it. He wasn't the best driver. He broke a couple of times, and he had a pretty intense rivalry going with a three-year-old out on the track, but he had a blast, and he told us that he's going to do it again and again.

Well, after hearing his inspiring story, it started to sink in that I really have to give racing a shot. My problem is that I automatically want to go out and win, or do extremely well. Well, my expectations are obviously a little too high, so I've now set some pretty reasonable goals. I want to go out and just finish a race; that's it. And I think I can do it, too. I'm a decent driver, so why couldn't I get around a track in one piece? So what if I lose—big deal, right? The other day, I asked Gordon if he wanted to go racing with me, and I'm happy to say that we're both heading to the track the day after tomorrow. I'm really excited about going!

OK, so now that you've waded through all the hoopla, here's the moral of the story: R/C racing in any form can be kind of intimidating to a newcomer, but it's fun, and you shouldn't be afraid to give it a shot. You might make some new friends, and you'll probably have a blast doing it! Well, everyone, wish me luck; maybe I'll get lucky this weekend, and I'll bring home a trophy for the Car Action office.

John Howell

We want to hear from you! Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chrisc@airage.com; John Howell (Doog)—johnh@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

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LETTERS

KUDOS TO TAMIYA

I think it's about time that someone gave credit and thanks to a model company for its great contributions to the R/C car racing hobby.

We've been involved in R/C racing for more than 24 years. For the first 10 years or so of its evolution, R/C was a small, little-known hobby. Then Tamiya, whose kits were, at that time, imported by MRC, introduced off-road R/C cars to hobby shops. At the same time, they worked with hobby shops to set up racing programs.

This started the big boom in the hobby, and because there were enough people buying R/C cars and accessories to make it very profitable, a lot of other companies jumped on the bandwagon. Most of these companies contributed to the hobby by sponsoring big race events and paying for trophies, which is all well and good; but very little was done to get new people started in the hobby.

In the early 1990s, R/C car racing, which had become very high-tech and expensive, suf-

fered a recession that mirrored the general economic recession that the whole country faced.

So a few years ago, Tamiya America introduced its new line of scale, on-road R/C racing cars, and again, aggressively pursued hobby shops to get them to set up parking-lot racing programs. Tamiya's program emphasizes the use of low-powered bushing motors. This alleviates much of the cost of racing and slows the cars so that people with average hand/eye coordination can compete, and it makes the racing closer and more exciting.

Tamiya's effort to get hobby shops involved in parking-lot racing has rejuvenated the hobby. Once again, Tamiya has shown the rest of us how to increase the number of people involved in R/C.

I hope that the rest of the industry and the rule-making organizations take note of Tamiya's success and work with hobby shops to bring more people into the hobby. After all, R/C car racers get started at hobby shops.

We at Kimbrough Products give Tamiya our sincerest thanks for their promotion of the R/C car

hobby. We wish them continued success in this endeavor and with their overall business.

CHUCK KIMBROUGH
Kimbrough Products

HE LIKES FLYIN' HIGH

I love your work and your magazine. I agree with your "Editorial," "Off the Road Again," that there should be more big jumps on tracks. I used to live in Phoenix, AZ, where I raced at SRS. All the jumps were suffering from wussy-itis. Now I live in Lander, WY, a town of 7,000. There's no track here, and only a few of my friends have 1/10-scale cars; but that doesn't stop us from racing them like crazy. We also build large jumps to fly over. I own a Traxxas Hawk 2 and a Traxxas Nitro Hawk. So far, the Nitro Hawk has soared 35 feet, 9 inches, and the Hawk 2 has made it 27 feet, 4 inches. Flying our cars has become a favorite event for my friends and me, and I think it should be made a sport like R/C truck pulling.

I would like to know how to contact the "Troubleshooting" and "Pit Tips" columns so I can contribute.

C.J. BERRY
krberry@wyoming.com

Hey C.J., what's up?! Thanks for writing; I appreciate your feedback. You wouldn't believe how many people here were bustin' on me about that "Editorial"; they all thought that no one would like it, but I proved 'em wrong. Ha, I proved 'em all wrong! So far, I've received a ton of e-mail and letters on the subject! Anyway, you should try your cars out

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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LETTERS

on a BMX track if there's one around; it's totally killer! And as for your "Trouble-shooting" and "Pit Tips" questions; write in, or send them to us over the Internet and title them accordingly. Thanks again for writing.

Doogie

KEEP ON CLODDIN'

First, I think all of you on the *Car Action* staff do a great job. Keep up the good work. Second, I was wondering if there's any way to build a Clod Buster using ESP parts without having to buy the stock kit from

Tamiya. Thanks a lot.
GREG SANDHAGEN
Sarasota, FL

Funny thing you should ask, Ray. You can get away with it without having to buy the whole kit. The items you need are the gear sets for both the front and rear gearboxes and the gearboxes themselves (unless, of course, you use aluminum aftermarket gearboxes). You'll also need those red pieces that go around the gearboxes that the bumper is attached to, and I think that's it! If you call the

Tamiya factory at (714) 362-2240, they might be able to give you more info. Good luck!

Doogie

WHERE SHOULD I GO?

Do you know if anyone still carries the LS-II? If so, how long do you think it will be available? If it isn't available through mail order, do you think I could call Traxxas and find one? I would appreciate any information you can give me. Thanks!

SCOTT

Mtnkool3@aol.com

Well Scott, Traxxas stopped making the LS-II more than a year ago; but if you're lucky, you may find a leftover kit sitting on a hobby shop shelf. If that doesn't work, call a few mail-order houses; there might be one sitting in a warehouse. Also, you could search the classified section of your local newspapers. Hey, you never know!

My advice is to check out Traxxas's new truck—the SRT. It replaces the LS-II, and it's available for about the same price. I called Traxxas to verify that the LS-II is no longer available, and they assured me that they'll continue to offer full replacement parts for it. So if you happen to find one, you won't have any trouble getting parts.

Doogie

CHATting ONLINE

Can we really "chat" with you guys online, or do we have to do it by e-mail? What system do you guys use: AOL, Prodigy, Compuserve?

FRANK RIZZO
Queens, NY

We can be reached most easily through e-mail. You can write to us at the Internet addresses on the previous page. If you post on rec.models.rc (the international R/C news group), we'll most likely read it. As for a real-time chat, you might catch me on AOL, but I'm the only one online. I usually check in late at night (EST), and I've chatted with a few readers. My AOL screen name is JKHUBER, so give that a try sometime. You never, never know. *John*

MAN OF DECISION!

I plan to buy an RC10ST. This will be my first R/C car, and I don't know much about them, but after a year of reading your magazine, I've made my decision. What do I need to make the RC10ST into a full RC10T?

LONDON CRUMMETT
Marshall, VA

The ST truck is exactly the same as the RC10T—minus some of the trick stuff. The first difference between them is that the ST comes with bushings instead of bearings. The ST comes with a mechanical speed control; an upgrade to an electronic one would be a good choice. The shocks on the ST are gold-anodized; the 10T has hard-anodized units and can be upgraded at any time. The ST comes with dogbones, and the 10T comes with universals; you can upgrade to either the 10T universals or the MIP CVD drive shafts. *John*

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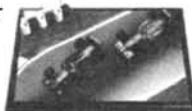
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A TOUCH OF RED

Jeff Smith of Oregon City, OR, sent this photo of his 1/8-scale Monogram '65 Corvette Stingray. It features a straight-axle rear end, and the steering servo is located inside the motor block. Power comes from a 6-cell battery pack (behind the seats), which provides the juice for the stock Pocket Rocket motor. The Stingray is detailed with a complete interior, motor, motor compartment, door handles, windshield wipers, bumpers, taillights and complete factory insignias; it always creates interest when it takes to the track. Nice job, Jeff.

T3—A TANK TERROR

This killer ride comes from Randy Coolbaugh of Willseyville, NY. Based on a Tamiya Bruiser chassis, this scratch-built tank is a cross between an A.M. General HMMWV (Hummer) and a German SDKFZ no. 250/3GREIF. Randy claims his truck has: a stock motor with a liquid-cooling system and thermostatically controlled fan; onboard, black-and-white night-vision video cameras; support monitors; rockets; a side-mounted laser with a 65-foot range; a flamethrower; a hydraulic vee-plow; and a turret-mounted bionic ear. Randy says that this tank is capable of seek-and-destroy missions of up to 2,000 feet without visual contact. So if you see Randy coming, move or face the consequences!



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1995. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



CHEYENNE'S FIRST BORN

Henry Arnold's Team LSI Double-XT was the first of its kind to be sold and assembled in Cheyenne, WY. The truck is equipped with a LSI 14-turn double "off-road" mod motor, 1700 SCRC battery packs and MIP CVDs. It's controlled by Futaba Magnum Sport radio gear and a Novak Hammer Pro ESC. The truck is painted a pearlescent purple, has a deep purple rear deck and sports handpainted flames. Good job, Henry!

PREPARE FOR LIFTOFF

Tired of all those little sissy jumps around your yard? Want your RC10T to jump high and far? Try what Jerold Esterlein and our editors have already tried—jumping a truck off insane, 4- to 5-foot-high, vertical bike jumps. Jerold takes his truck around his neighborhood in Vista, CA, in search of these jumps; when he finds one, he launches his RC10T 6 to 10 feet in the air. He says that he has had a few crashes, but the fun of seeing his truck sail through the air was well worth it. (Remember, a flying R/C car can be dangerous, and it could get broken.)





NASTY NASCAR

Donald "Chris" Craig Jr. of Reisterstown, MD, sent this photo of his latest labor—a BRP 1/18-scale stock car that sports Autographics 1/24-scale decals. Donald tells us that the trick paint job took many hours and many pots of coffee to complete but was worth it; his car gets a lot of attention at local parking-lot races.

HOUND DOG'S DREAM

This MRC MT-10S comes from R. Craig Hoffman of Woodbridge, NJ. Craig says that, with some hints and tips from *R/C Car Action*, he was able to make the truck look better, drive faster and handle any terrain easily. He modified it with an Iron Man Panther modified motor and a Novak 410-M5. Lucky for the MT-10S, this combination makes the truck go too fast for Craig's basset hound to keep up.



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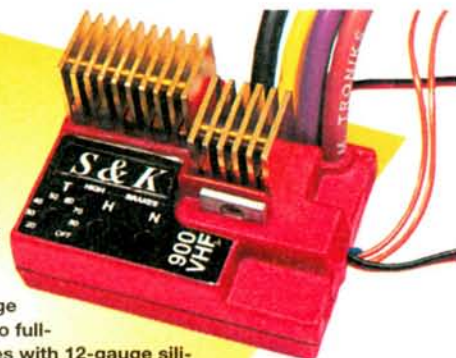
In search of fun
and glory, cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE Scoop



S&K Gets the Power to You

Jumping headfirst into the ESC wars with four units is aftermarket company S&K. The company, which is well-known for its Battery Claw and assorted on- and off-road bodies, now has a wide range of speed controls from entry-level units to full-blown racing-style ESCs. Each unit comes with 12-gauge silicone wire, a thermal shutdown feature and a 1.9x1.3x0.6-inch case and can handle four to 10 cells; all the units come with a six-month warranty. For all you hardcore racers out there, S&K's high-end ESC—the 900VHF—switches at 7500mHz; that's three times higher than many other racing-type ESCs. For more info on their new line of speed controllers, contact S&K at (800) 483-2675.



TRINITY

Spec Brush

New from Trinity is this unique Spec brush. What's so unique about it, you ask? Well, it brings stock racing back to the level at which it belongs—on a level playing field! The days of trying to pop-off your buddy by using the "hot brush of the week" could be over. This stock brush is awesome if you and your buddies want to get together and do a little spec racin'. It's easily identified by the silver and copper-colored shunts and the letter "S" that's stamped on the back of it, and it will make stock racing closer because everyone will be running the same brush. The new Spec brush works well in all forms of stock motors. Also, it will be mandatory at all Street Spec races. For more info, contact Trinity at (908) 862-1705.

MIP Steers Clear

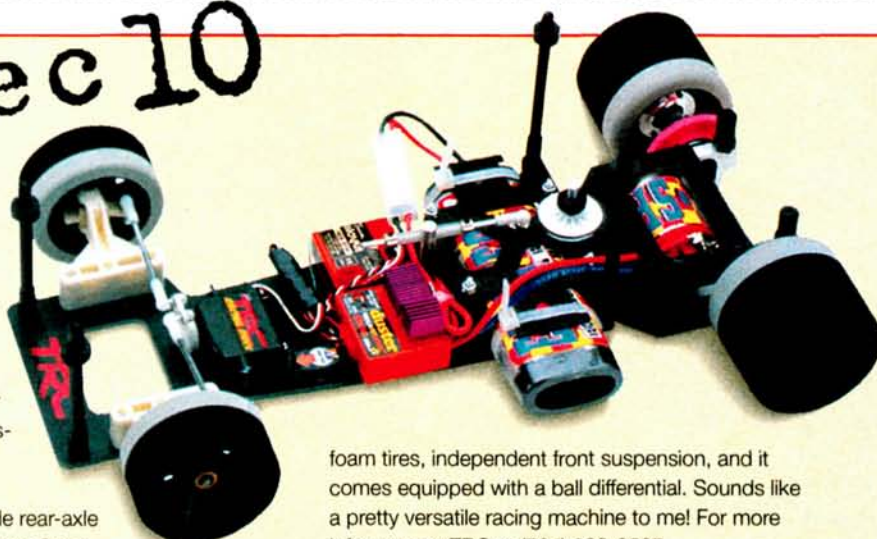


MIP now offers their direct replacement Zero Maintenance Light Weight Ball Bearing Steering System for the Losi Double-X and Double-XT. According to the folks over at MIP, their steering system is stronger and smoother and lasts longer than any other in today's market, and it eliminates side play and bump-steer. The extremely durable and rigid bellcranks are made of virgin glass-filled nylon. Included with the system is a set of precision, Teflon-sealed ball bearings and ultralight aluminum posts. List price—\$29.95. For more info, contact MIP at (818) 339-9007.

TRC

Spec 10

Jumping on the spec-racing bandwagon is TRC with their new Spec 10 car. With the proper body, the car can be raced in Trinity's Street Spec series in either the Stocker or Spec-Truck class. Or, if you and your buddies are looking to start up your own inexpensive race club, this car might be for you. The car features a super-tough G-10 fiberglass chassis, a rear T-bar suspension with damping control, and it has five axle positions and adjustable front toe-in. Other features include rear-axle bearings, an aluminum motor plate, TRC Street Spec



foam tires, independent front suspension, and it comes equipped with a ball differential. Sounds like a pretty versatile racing machine to me! For more info, contact TRC at (704) 982-0507.

INSIDE scoop

Major Impact

New from Serpent is this Impact-2 Pro 1/10-scale gas racer. The Impact-2 is available in both 2WD and 4WD configurations. Hot features include fully adjustable suspension, a Centax clutch system, a ball-bearing belt tensioner, an aluminum 2-speed tranny and quick-change wheels—all built into a lightweight design. Team Serpent's Pieter Bervoets and Michael Salven recently went to Osaka, Japan, to introduce the new car at an open 1/10-scale, on-road race, and Michael won the race with the car in 2WD configuration using a box-stock Mega SX-15 engine. Even more impressive is that he competed against a field of highly modified 4WD cars that used wicked-hot, tweaked engines. For more info, contact R/C Motorsports of Miami Inc. at (305) 620-0005.



TRAXXAS



BANDIT



Traxxas has really been on the ball lately! Their two latest 1/10-scale trucks—the Stampede and the Rustler—have been selling like hotcakes and now, they have a new entry-level car based on the Rustler's chassis. So far, it has been code-named the "Bandit." The car shares its wide stance and long, stable wheelbase with its truck brother. Other features include: a sleek new body modeled after the TRX-3/TCP; long, tunable, oil-filled shocks with clip-on spring adjusters; a bellcrank steering system; telescoping U-joint drive shafts; 48-pitch gears; an adjustable wing; a planetary gear differential and Oilite bushings throughout. The kit will be just as affordable as the Rustler, and both the kit and the ready-to-run version will include a 540 motor and a mechanical 3-step forward-and-reverse speed control. For more info, contact Traxxas at (214) 613-3300.

Zero Gravity Pinions

Trinity Pinions...Ours are precision machined from 6061 T-6 aircraft aluminum and teflon impregnated for smooth meshing and minimum friction.

Trinity Zero Gravity Pinions Are Super Light!

Brand "R" Pinions Are All So Over-Weight, Power is Reduced!

Brand "R" ...They have poor tooth finish and profile. They don't mesh well with the spur gear.

From Magic Motor Sports

\$5.99

In 48 pitch from 12 to 30 teeth • In 64 pitch from 15 to 50 teeth



We Are Your Source for ALL R/C Racing Needs

Trinity Products Inc., 1901 E. Linden Ave., #8, Linden, NJ 07036 • (908) 862-1705 • Fax (908) 862-6875

If you race, you know how careful you have to be when transporting your Ni-Cd batteries to and from the track. If you happen to put them in a pit box without covering the battery bars and you expose them to metal tools, you risk the chance of shorting them out in a big way. Have you ever seen a battery short out on something metal? I have, and it's an ugly scene! If you want to get your batteries to the track safe and sound, check out this trick Roll-Up Battery Bag from Dirt Bagz. It has five separate pockets to hold your 6- and 7-cell packs, and it also has a clear pocket at the

Roll 'em Up

&

Move 'em On Out!

top of the bag for miscellaneous parts and/or battery accessories. Just pop the batteries in, roll up the bag, secure it with a strap, and you're all set to go! For more info, call Dirt Bagz at (714) 630-2247.

It's almost time for the IFMAR Off-Road Worlds again! For those of you who have been in a hole or are just getting into this cool hobby, the IFMAR Off-Road Worlds occurs every other year (usually in late summer), and it happens to be the biggest and most important off-road race imaginable. Racers come from all over the world to determine who will be crowned the 2WD Buggy and 4WD Buggy champions for the next two years. In 1993, the race was held in Basildon, England, and the champs who emerged were Brian Kinwald (2WD) and Masami Hirosaka (4WD). Well, this time around, the event will be



**PAVIDIS
BEATS
'EM ALL**

held in Japan at the Yatabe Arena. Many top drivers from the U.S. recently went over to Japan for an IFMAR Worlds warm-up race, and the man you see here, Team Associated's Mark Pavidis, took top honors in the 2WD Buggy class. So, who do I think will be the next champs? Well, here are the mighty Chianelli's predictions: in 2WD, it will be either Associated's Mark Pavidis or Yokomo's Masami Hirosaka piloting an Associated car, or Trinity's Brian Kinwald or Team Losi's Greg Hodapp driving Double-Xs. In the 4WD division, Masami Hirosaka's Yokomo will be the car to watch. Stay tuned!

HAVE YOU BEEN SCREWED BY TRINITY LATELY?



You Haven't Been Unless You Are Using Our New Light Weight Purple Aluminum Screw Kits!

PURPLE SCREW SETS

TRINITY		
EV0142	Evolution 10, On-road	\$19.99
EV0157	Evolution 10, SS or LSD	\$19.99
RE1027	Revolver 12, On-road or SS	\$13.50
ASSOCIATED		
EV0146	10L, On-road or LSO	\$11.99
EV0156	12L, On-road	\$11.99
EV0147	RC10 Buggies, All Styles	\$14.99
EV0148	RC10T Trucks, All Styles	\$18.99
BOLINK		
EV0158	Bolink, On-road or SS	\$12.99
TEAM LOSI		
EV0149	Losi XX Buggy	\$12.99
EV0155	Losi XX Truck	\$12.99

PURPLE SCREWS AND NUTS

D1052	4-40x3/8 Cap Head Screws, 12pc	\$4.99
D1053	4-40x3/8 Flat Head Screws, 12pc	\$4.99
D1054	8-32x7/8 Flat Head Screws, 8pc	\$2.99
D1055	4-40x1/4 Cap Head Screws, 12pc	\$4.99
EV0150	2-56x1/4 Button Head Screw, 12pc	\$5.99
EV0151	8-32x5/8 Flat Head Screw, 12pc	\$4.99
EV0152	4-40x1/2 Socket Head Screw, 12pc	\$5.99
EV0153	4-40x1/2 Flat Head Screw, 12pc	\$4.99
EV0154	4-40x3/4 Socket Head Screw, 12pc	\$4.99
EV0143	4-40 Mini Lock Nuts, 8pc	\$3.50
EV4054	8-32 Nuts, 8pc	\$3.99



Free Sticker In Each Package!

TRINITY

1901 E. Linden Ave #8, Linden, NJ 07036
PH: 908-862-1705, FX: 908-862-6875

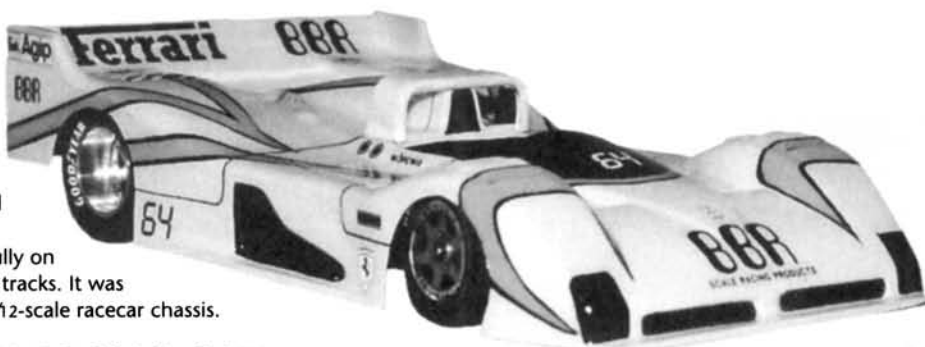
BBR

Ferrari 333SP WSC Body

This 1/12-scale, well-detailed version of the Ferrari World Sports Car handles beautifully on both carpet and pavement tracks. It was designed to fit all current 1/12-scale racecar chassis.

Part no.—B15; price—\$12.98.

BBR Scale Racing Products, 156 Azalia Dr., E. Palo Alto, CA 94303; phone/fax (415) 327-8283.



HITEC/RCD

HS-705MG

This 1/4-scale servo has three metal gears and comes with a top ball bearing and a metal ring to prevent the horn from becoming stripped. It also features SMT circuitry with four powerful FETs to withstand the 160 oz.-in. of torque that it generates.

Part no.—HSE0705; price—\$69.95.

Hitec/RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071-2854; (619) 258-4940; fax (619) 449-1002.



BRP

Roof-Mounted Wing Wire Kit

This new mounting system allows you to get all that unsprung weight off the rear pod and to keep the angle of attack on the wing constant with the air-flow. It also allows you to remove the body without first removing the wing. The kit comes with mount-



ing buttons and pre-bent 0.078 wing wire. (Wing not included.)

Part no.—5246; price—\$5.95.

BRP Inc., 1575 Lowell St., Dept. RCCA, Elyria, OH 44035; (216) 284-0270; fax (216) 284-0271.

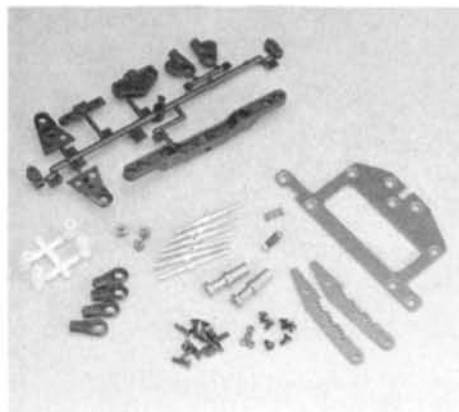
WOOD RACING

X-005 Indy Racer

This new Indy racer features a light graphite chassis; a floating rear pod with extended aluminum side plates; saddle-pack battery slots; tri-shock suspension with adjustable center shock; and much more! The kit includes a complete rolling chassis, body, front and rear wings, antenna mount, bearings and body mounts. (Tires not included.)

Part no.—9505; price—\$495.

Wood Racing, 405 Virginia St., Auburn, MI 48611; (800) 424-WOOD.



KYOSHO

Suspension Kit for the Impress

This kit includes all the parts you'll need to upgrade the Impress's stock, fixed and partly adjustable front suspension to a fully adjustable turnbuckle style. Also included are the parts you'll need to change the T-bar rear suspension into a fully adjustable, center-pivot, trailing-link pod. The kit allows you to make full adjustments and that gives serious racers maximum control over track performance.

Part no.—KYOC6050; price—\$64.99.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

PRO-LINE

F1 and Indy Mount-and-Glue Caps

Made of XTR soft racing compound, these new radial-design caps provide top-end performance for your parking-lot machine and create extra traction on concrete surfaces.

These mount-and-glue caps are designed to fit Tamiya and Kyosho F1 and Indycars.

Part nos.—1062 (front), 1064 (rear); prices—\$8.95, \$9.95.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.





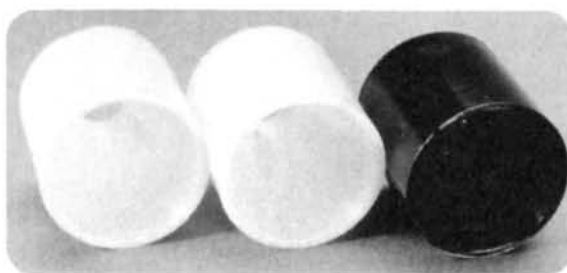
KLOTZ

Modelube®

This synthetic lubricant was developed to provide your scale engine with carbon-free idling, instant acceleration and cool, clean running. Blend it at 32:1 to 50:1 ratios for best performance.

Part nos.—KL308 (4 ounces; case of 20), KL310 (12 ounces; case of 10); **price**—\$31.80; \$39.70.

Klotz Special Formula Products Inc., P.O. Box 11343, Fort Wayne, IN 46857; (219) 749-0489; fax (219) 749-6234.



TEAM ASSOCIATED

1/12-Scale Stealth II Rear Wheels

These new dish rear wheels have been designed to work with the Stealth II 1/12-scale diff kit. They easily bolt onto the new rear axle and reduce the overall weight of the rear-axle assembly. They're available in three colors.

Part nos.—3609 (dyeable white), 3609B (black), 3609Y (fluorescent yellow); **price**—\$3.50/pair.

Team Associated, 3585 Cadillac Ave., Costa Mesa, CA 92626-1403; (714) 850-9342; fax (714) 850-1744.

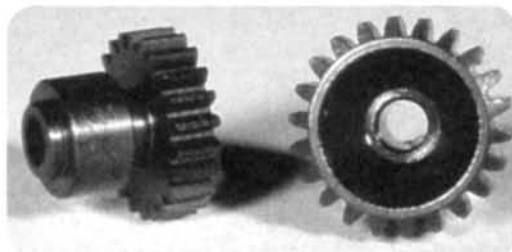
TRINITY PRODUCTS

Kinwald Hard Ones

The 48-pitch pinion gears are fashioned out of steel and made in Trinity's Zero Gravity configuration. They range in size from 12 to 27 teeth, and each gear is case-hardened to a guaranteed 58-62 Rockwell C-grade hardness. The hardening process of the material is consistent to .0010 of an inch into the depth of the gear. This means that the gear would have to be completely destroyed before it would lose its tooth form. To help prevent rusting, each pinion gear features a black-oxidized coating.

Price—\$4.99.

Trinity Products, 1901 E. Linden, #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



T.M. R/C RACING COMPONENTS

Demon Motor Drops

These new race-proven motor drops increase rpm, lower amp draw and increase torque. Motors will run longer and cooler with reduced wear on the comm. The drops can be used with stock and modified motors.

Part no.—2481; **price**—\$6.95.

T.M. R/C Racing Components, 49679 Leona Dr., Chesterfield, MI 48051; phone/fax (810) 949-3506.



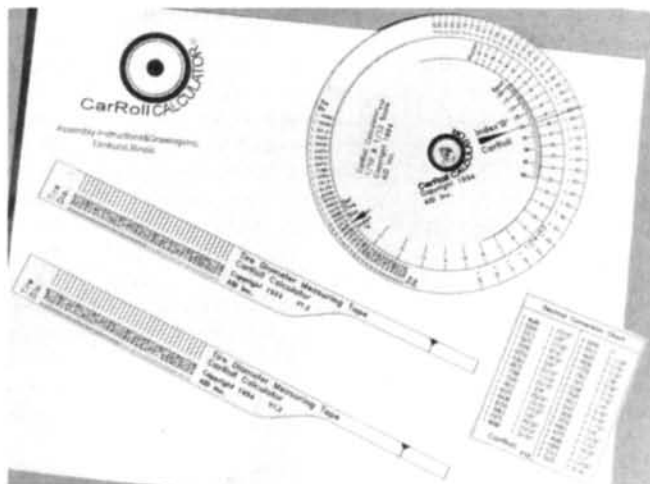
ASSEMBLY-INSTRUCTIONS & DRAWINGS INC.

CarRoll Calculator

This specialized circular slide rule is used to calculate rollout, i.e., the movement of your car in inches per one revolution of your motor, and it allows more flexibility than printed rollout sheets. Using tire diameter and the number of teeth on your spur and pinion, you can easily determine your rollout and, conversely, using tire diameter and the rollout you want, you can calculate your gear ratio.

Price—\$9.95.

Assembly-Instructions & Drawings Inc., 107 E. Vallette, Ste. 349, Elmhurst, IL 60126; (708) 766-0425; fax (708) 941-8379.



T.A. EMERALD

Performance Plus 2 Motor Spray

This advanced motor-maintenance cleaner was developed specifically for stock and modified race-car motors. It improves motor performance and efficiency, prolongs run times and extends motor life. It also evaporates quickly, has a pleasant scent and won't harm plastic or Lexan bodies.

Part no.—2500;

price—\$5.99.

T.A. Emerald Industries, 92 Corporate Park, Ste. C-127, Irvine, CA 92714; (800) 280-0020; fax (714) 631-4304.





TROUBLE SHOOTING

by John Huber

SCREW SPEW

I recently bought a brand-new RC10GT. Whenever I run it, the screws fall out (the engine-mount screws are the main problem.), and I have to keep going to the hobby store to buy them. Also, the big screw that's used to mount the steering plate on the chassis fell off while the car was going at top speed (35 to 40mph). What should I do to prevent this from happening? Also, before it was running, the spur gear was warped. Should Associated replace it?

JASON EVART

Orangevale, CA

The first rule of gas racing: use **THREAD-LOCK!** For most of the screws, including the engine-mount screws, use Loctite 242

blue. I'd suggest 271 red for the engine-mount screws, but on the GT, the screws have a head that uses a $\frac{1}{16}$ hex wrench. It's hard



to tighten these screws enough without stripping the head, and the heavy-duty thread-lock would make it impossible to remove them. Use the 242 stuff, and if the engine bolts still come loose, you might want to use bolts with a larger ($\frac{3}{32}$) head. As for the spur gear, call Associated on that one; they should take care of it. But before you do, make sure that the gear is really warped and that the slipper pad hasn't moved and made the gear just look warped.

If you have technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



CHARRED CHIPS?

I'm 13 years old and started R/C racing about a year ago. My first truck was Team Losi's Junior T. I got it for Christmas, including the full ball-bearing kit. Now I'm having a little trouble with it. I have a Futaba MC210CB speed control with the Futaba Magnum Junior radio gear. I also run an Onyx 14-turn double modified motor. Whenever I go to run the truck on relatively rough and sometimes smooth pavement, I hear

a noise that sounds like a slipper clutch coming from the transmission. My truck doesn't have a slipper, and the differential tightening screw and locknut are as tight as they can be.

I have another problem: I went to run my truck one day, put in the Onyx motor and turned on the switch. A big puff of white smoke came out of it, and it smelt like burnt computer chips, and the fuse was blown.

How would the Tekin 412-P SpeedStar handle the power? Please help me.
ERIC J. MOODY
Joliet, IL

Your ESC—the MC210CB—isn't the best choice for modified motors, especially a 14-turn motor. If smoke came out of it, I think you've already found this out the *hard* way. As for the slipper, there are several things to check: first (and this may sound stupid!), check the tires. Make sure they're glued to the rims. I have seen people scratch their heads for days trying to figure out what's slipping, when all along, it was the tires. Also make sure you still have the cross-pins in the rear axles. If these check out, remove the diff, and make sure it has been built according to the instructions. Then hold the two tires firmly, and try to turn the spur gear; it should be locked, or at least very tight.

RIPPIN' REVERSE—NOT!

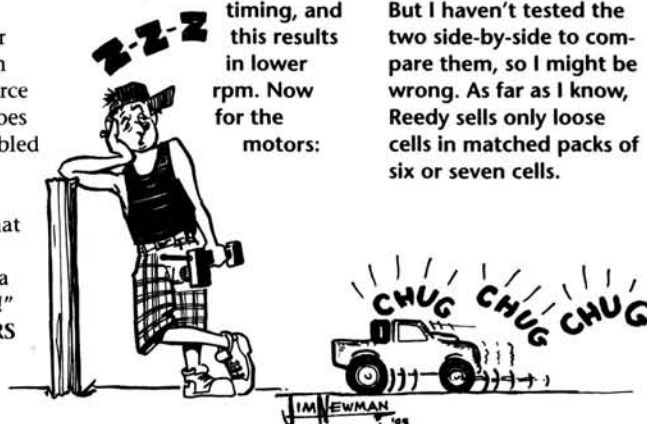
I installed a Novak Rooster ESC in my Associated RC10CE. It runs well, but the reverse doesn't go as fast as forward. Is this normal? I also have a Reedy Force 2 stock motor, and I'm thinking of getting a Reedy Mach 2 stock motor. Will it go faster than the Trinity Green Machine 2 and the Force 2? One more thing: does Reedy make an assembled 1700 6-cell battery pack?

I just gotta say, "That R/C Car Action magazine is all of that and a bag of barbecue chips!"
CHARLES CARITHERS
Boston, MA

The motor's turning more slowly in reverse has less to do with the ESC than with the motor itself. When run forward, stock motors can have up to 44 degrees of timing; when reversed, that becomes 44 degrees of retarded

timing, and this results in lower rpm. Now for the motors:

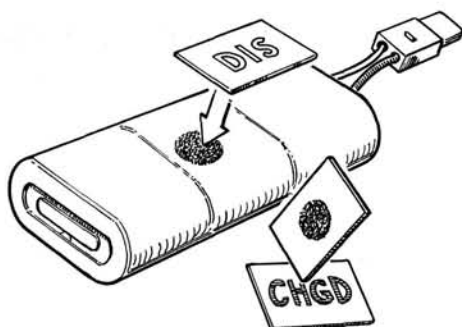
the Mach 2 and Force 2 are both NORRCA-legal and have 36 degrees of timing (Mach 1 has 24 degrees for ROAR races). The Green Machine 2 is a ROAR-legal, 24-degree motor and, as such, should be a little slower. But I haven't tested the two side-by-side to compare them, so I might be wrong. As far as I know, Reedy sells only loose cells in matched packs of six or seven cells.





PIT TIPS

by Jim Newman



CHARGED/DEAD TAGS

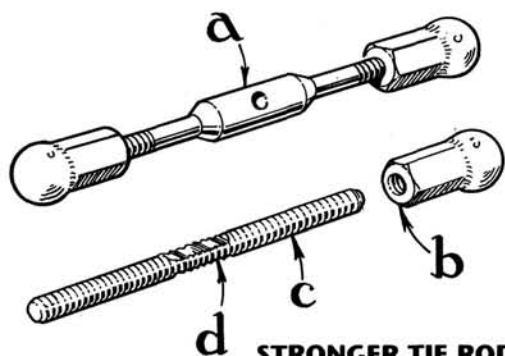
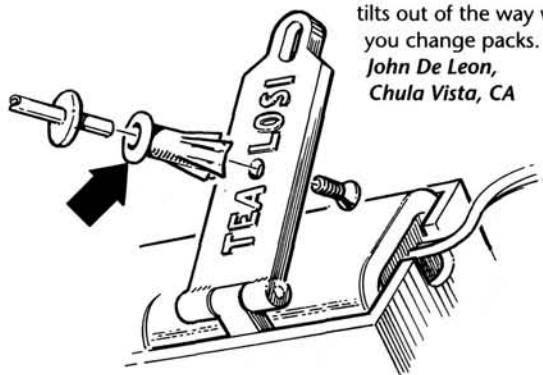
To determine the status of your Ni-Cd packs at a glance, attach Velcro®-brand fastener buttons to the packs, and fasten their mates to squares of plastic that can be colored red (for discharged) and green (for charged).

Michael Ortore, Staten Island, NY

LOSI ANTENNA MOUNT

To conveniently mount your antenna base on the Ni-Cd pack retainer, drill through the letter "M" and attach the base as shown. The antenna tilts out of the way when you change packs.

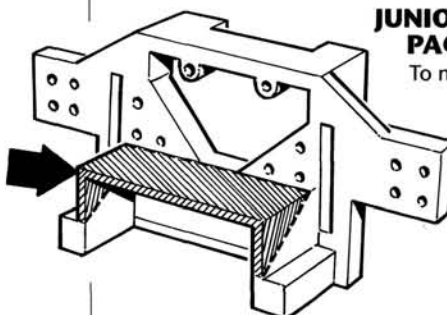
*John De Leon,
Chula Vista, CA*



STRONGER TIE RODS

Remove the existing adjustable 4-40 tie rods (a), re-tap the holes (b) in the ball joints to 6-32 thread, then obtain 6-32 threaded rod from a hardware store, and cut it to fit. File off the threads at (d) to allow you to grip the rod while you make adjustments.

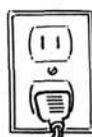
Geoff Jigamian, Temecula, CA



JUNIOR TWO BATTERY PACK FIT

To make non-standard battery packs fit, trim the shaded area off the rear bulkhead, as shown.

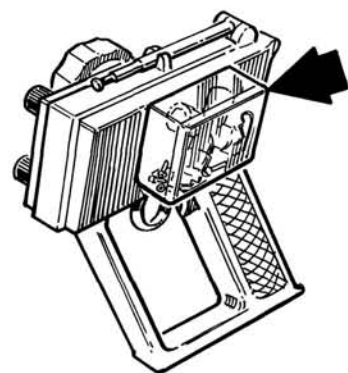
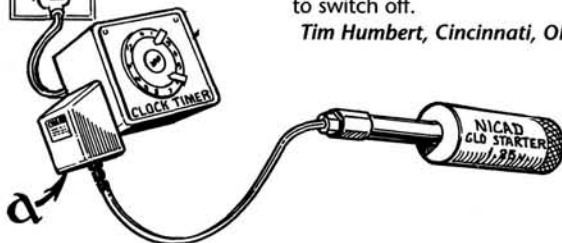
Kevin Grant, Camino, CA



"FIT AND FORGET" CHARGING

To avoid over-charging your Ni-Cds, plug your glow-plug Ni-Cd into a lighting timer, then set it to the time you want it to switch off.

Tim Humbert, Cincinnati, OH



COMPACT TOOL KIT

When you need only a few tools and spare parts, put them in a small, snap-top box, and fasten it to your transmitter.

Mike Kramer, Cottage Grove, MN

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



GETTING STARTED

by Brian Leslie

The "Never Evers" of R/C

THIS MONTH, I'll cover some of the major "don't do's" of R/C cars and trucks. You can save yourself a ton of money on repairs by following these rules of thumb:

- **Never ever run your R/C vehicle through water.** All R/C cars and trucks operate on DC current, and needless to say, electricity and water don't mix. Water is a very good conductor of current flow, so if just a single drop of water comes between two components in the receiver, servos, or electronic speed control (ESC), you could be looking at a major repair bill.

It's a good idea to wrap the receiver and servos in plastic, but don't wrap

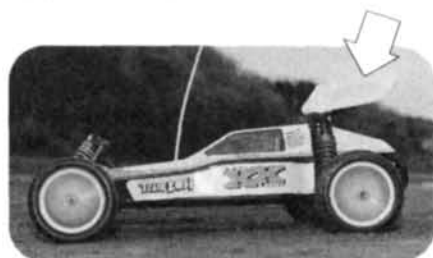
the ESC or motor. The ESC heat sinks need cooling because without it, they'll overheat. You could then find yourself shelling out a lot of cash for repairs. The motor needs more cooling than any other component, but obviously, you can't wrap it in plastic unless you want a meltdown. It's safest to avoid running your R/C car or truck through puddles or in the rain. If, at any time, you see condensation or any moisture at all forming on the case of an electronic component, stop everything and wait until everything is completely dry before you run your vehicle again.

- **Never ever run your R/C vehicle in the street.**

If you're watching your R/C car, you can't be looking out for full-size cars. If you want to run on pavement, go to a local school or church parking lot. If these places are not accessible, find a place that has zero automobile access. Basketball and tennis courts are great places to run and are usually just the right size for a decent race-track.

- **Never ever turn your receiver on before your transmitter.** This is the single most common mistake beginners make. As soon as you turn on the receiver, it receives signals

from the outside world. Without the transmitter telling the receiver and servos what to do, they do whatever they want. Typically, the motor goes to full throttle, screaming the car across the bench or driveway into a cement wall—or worse, someone's leg. So be sure to first turn the transmitter on, then the receiver,



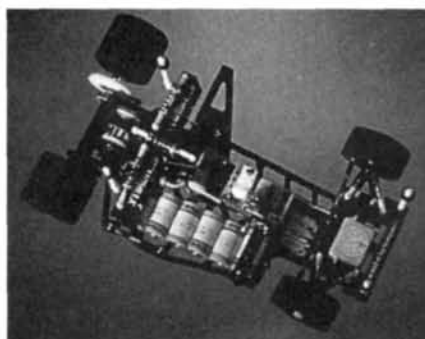
Why do off-road cars and trucks have wings and spoilers?

Traction, plain and simple. Wings and spoilers add downforce, pressing the car's tires to the ground for added traction.

Why are low-resistance battery connectors so important?

A poor connection between the battery pack and the motor or ESC can mean a seri-

ous loss of power. The higher the "on" resistance, the more power will be lost because of overheating. In other words, the closer the resistance is to zero, the better. Take a look at Deans* and Litespeed* plugs.



What is a pan car?

A pan car has a flat, one-piece chassis that is usually made of graphite or fiberglass. These cars are for on-road use only; they're very light and fast. The rear suspension consists of one to three shocks connected to what is called a rear pod. The rear pod houses the motor and the axle. The front suspension arms are usually fixed with spring-floating spindles. You can change the springs to adjust the suspension. Associated's* RC10L and Trinity's* EV10ss are examples of pan cars.



What's the difference between a monster truck and a stadium truck?

A monster truck is for climbing over obstacles and crushing innocent, puny little on-road cars. Monster trucks usually have gigantic tires and massive shock-absorber systems, so they're ready to take on some of the toughest terrain. Although monster trucks can be fast, their speeds can't compare with those of stadium trucks. Stadium trucks are built to go fast over rough, bumpy tracks. They're made to handle large jumps and perform as well as buggies in the corners.

Are the bodies the only things that differ on F1 and Indy-type R/C vehicles?

No. The chassis is slightly longer on Indycars, but otherwise, the two are almost



and when you've finished running, turn off the receiver, then the transmitter.

- **Never ever keep the throttle pegged if the motor isn't turning over.** Other than exposing it to water, this is the quickest way to fry your ESC. If the car stops suddenly, you should, too. A sudden stop is usually caused by a rock that has found its way into the teeth of the spur gear or main gear and is preventing the two from meshing properly. Whatever the case may be, make sure that you can turn the motor and drive train over by hand before you apply the throttle again. If the motor still won't turn over, chances are something has gone awry with the motor or ESC itself.

- **Never ever short out the reversing or braking heat sinks to the forward heat sinks.** Make sure that nothing comes into contact with the ESC's FETs or heat sinks. Many R/C chassis and parts are made out of aluminum and graphite, which are conductors of electricity. So it goes without saying that the heat sinks should not touch any part of the R/C vehicle. Wherever you place the ESC, make sure that it can get plenty of air for cooling, and always use the heat sinks provided.

- **Never ever leave any of the wiring in the car exposed.** If you have to splice wires, be sure to cover the splice with heat-shrink to prevent the possibility of shorting. This also holds true

for battery packs in your toolbox and on the bench. A 6-cell pack can potentially draw more than 80 amps when shorted. I know, most packs are only 1400mAh, so where do I get a figure like 80 amps? A 1400mAh pack can sustain a load of 1.4 amps for 1 hour and can therefore sustain 60 times that for 1 minute, and that equals 84 amps. You can practically weld with that kind of juice. Please be careful with your battery packs.

Just remember: R/C cars are not toys. These little machines can travel at very high speeds and cause serious injury. It's up to the operator to be responsible and use his/her R/C vehicle properly and intelligently.

identical. There's a plethora of body styles and choices on the market in both Indy style and F1. If you have a favorite team or driver, you can probably buy the body, wing set and decal sheet to produce a carbon copy of the full-size machine.

I'm thinking about getting a 1/10-scale stadium truck. Do I need special servos?

No. Most of the servos that come with radio systems can handle the steering chores of 1/10-scale trucks (with the exception of monster trucks). Typically, for the steering on stadium trucks, racers use servos that can produce at least 60 ounces of torque.



I own an RC10CE. What would be the best upgrades for it?

First, I'd buy an ESC. An ESC will give you the largest improvement in performance by smoothing throttle response and increasing run times. Check out the Novak* Duster Sport or Tekin's* 408-S. Next, I'd buy a full set of bearings and then some extra battery packs so I could run longer.

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.



**National Radio Control
Truck Pulling
Association**
Est. 1989

7th ANNUAL WORLD CHAMPIONSHIPS **September 23-24, 1995**

**Holiday Inn Resort Center
Montpelier, Ohio**

Trucks pulling event will have 3 carpeted pulling tracks. 14 NR/CTPA and 2 exhibition classes.

7 NR/CTPA classes of Monster trucks, Open Race trucks and Tanks. Events will have side by side drag races and the best obstacle course ever!

\$20.00 pre-registration fee
(\$25.00 after deadline of 9/1/95)
(Membership required before pre-registration deadline)

Pit space available either in the event area or in room if desired. In-house closed-circuit television in hotel. Watch pulls and races from your room. Restaurant, snackbar in event area, game room, in-door swimming pool, jacuzzi rooms and lounge.

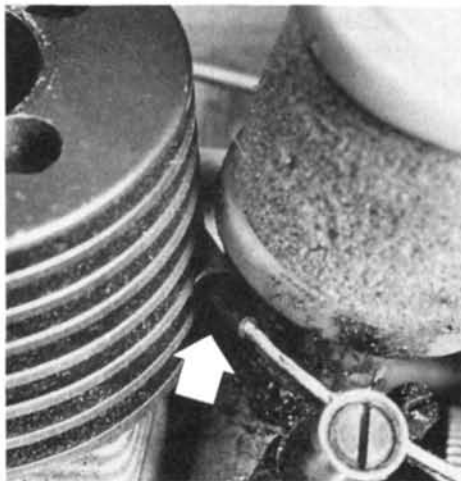
The Association has 18 Affiliated Clubs, 200+ members and covers the United States and Canada.

For more information on membership and information about the World Championships contact:
NR/CTPA
2321 Greenwood Court
Champaign, IL 61821
(217) 359-7628
Don Hubert, President



Testing MIP's On-Board Temp Gauge

One of the coolest gas-car products is the on-board MIP* Temp Gauge. Just bolt the sensor to your engine's head and mount the LCD display where it's easily visible, and you have a way to gauge your needle settings for best performance. The sensor sells for a fraction of the price of a hand-held infrared temp sensor, but how well does it work? Let's find out.



A small sensor is bolted to the engine head between the lower fins.

PREPARING

First, you must fuelproof the temp gauge. It's held together with a bunch of small screws on the bottom of the case, so place the unit on a flat surface and carefully remove the screws. Then remove the bottom cover and apply silicone sealant to the case edges and to the opening where the wire exits the case. Let the silicone dry, and re-attach the back cover. It's also important to seal the LCD

window that's on top of the unit. A small plastic window cover is included in the kit; glue it into place with silicone glue. When you've finished sealing, it's time to mount the gauge in your car.

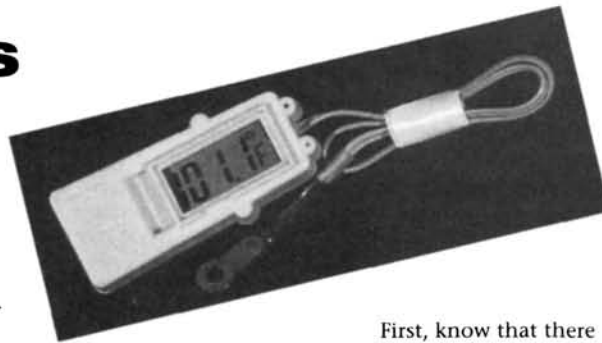
MOUNTING

On some engine heads, the bolts are slightly countersunk. With this type of engine, you can't use the temp gauge's mounting lug, or you'll damage the gauge's thermistor probe. Glue the sensor lug into place between the bottom fins with a good-quality silicone and let it dry overnight. On an engine that has a standard head, you just remove one head bolt, slide the lug between the lowest head fins, and drop the head bolt back in.

Mounting the display unit is even easier. I used double-sided foam tape and added a little Shoe-Goo for extra security. Be sure to let the Goo dry at least overnight, or the gauge will fall off.

TESTING

For some time now, I've been testing the MIP gauge by comparing its readings with those of my Raytek temp gun. I've used the Raytek unit for three years (see my review in the July '92 issue), so I'm used to the way it works.



First, know that there isn't one perfect temperature at which to set your engine: it will differ from engine to engine, from car to car and even from day to day. A temp gauge will allow you to put a number on an engine that's running well, so you can try to keep it in that range.

When I tested MIP's unit against Raytek's, I found that at about 60 degrees Fahrenheit, they were within a degree of each other. But at full operating temperature, the readings were very different. I ran the car and adjusted the carb until I had the engine running well. I checked the temp with the Raytek gun: 220 degrees—a nor-

slightly different parts of the head by totally different methods. Knowing that an MIP temp of 265 degrees means that my car is running well, I have something to aim for in the future.

I've since run several times checking only with the MIP unit, and its readings have been consistent. The unit is so sensitive that after I had pulled the engine's pull-starter a few times, I could see the temp rise a degree or two—before the engine fired up!

With a quick glance at the MIP unit, I can tell whether I'm on the mark, or at least in the ballpark. And believe me, a glance is quick. All you have to do is look straight down through the window of your car and read the display. It's much easier than trying to get the temp with a temp gun.

The MIP gauge comes with a complete tuning guide that lists ranges for which you should shoot for best operation. Read the instructions thor-



The display unit is mounted on the chassis wherever it can easily be seen. Use Shoe-Goo to ensure a solid mount.

oughly, and be sure to follow the fuelproofing steps. Using the MIP unit on your gas car will make tuning your car infinitely easier, and your engines will last longer, too!



Stuff You Really Need to Have

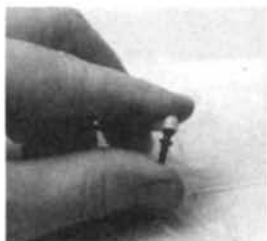
I don't know about you, but I'm always on the lookout for R/C products and techniques that will save me time or make my car more reliable. A lot of stuff is recommended to me by fellow racers at the track, the park and the parking lot, and it's not all necessarily new. Sometimes, I find out about a new application for something that has been around for years.

The items you see here have survived the ultimate torture test—the real world. These are all products that I've used, abused and thrashed. They work; take my word for it.



These T.D. Protectors come in all sizes: 1/10- and 1/12-scale, narrow and wide, and even pre-trimmed for those who can't be trusted with a sharp knife! They all come with easy-to-follow directions.

Use a small piece of plastic to tighten up the ball links on your steering and suspension. It really works!



BAG IT

Are your ball links and nylon cups getting a little loose? Sometimes, excessive play in the ball ends can be a major contributor to sloppy front-end behavior. To eliminate this dreaded linkage looseness, I tested several ball-end, cup and parts combinations. I couldn't find that elusive combination of security, smoothness and ease of movement. Then late one night, while in my secret laboratory, I had this

great idea: use plastic film to take up the slack between the ball and the cup! At first, I thought about using pieces of old plastic baggies (they were in the trash can next to me). Then I had another thought: plastic comes in different thicknesses—or mils—right? So at 2 a.m., I searched the kitchen for different plastic bags.

I found that you can tighten up a really loose ball-joint link by using the plastic from the insides of cereal boxes (it's really thick and stiff). Balls that are just starting to loosen, like those on my oval car, require thin plastic wrap—bingo, just like new! For ball joints that are between those two extremes, I use pieces of plastic garbage bags. The possibilities are endless!

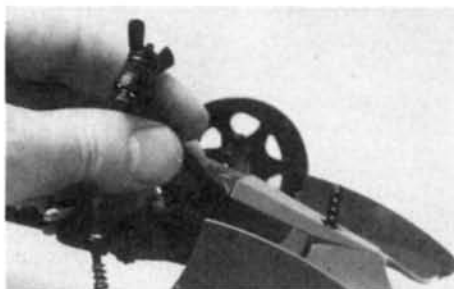
PROPER PROTECTION

These deals have been around for years, and I always thought they were bogus, until I tried them myself. They're called T.D.* Protectors, and they save your Lexan oval and on-road bodies from impacts and early graves. Most bodies start to crack over the bumper in front and over the wheel wells. That's because those areas hit boards, cars, dots and other stuff. Bodies also vibrate, and vibration eventually causes Lexan to become fatigued and brittle; one day it's gorgeous, and the next day it's cracked. Pretty soon, you have to throw it away.

Mount up a T.D. Protector, and you can almost double the life of your car's body. Drill holes for the body posts, trim the rear of the protector to fit in front of or between the various front-suspension components of the car, and cinch it down tightly with an extra set of post collars or plastic nuts. This will support the body much better, and the protector will resist impact much more effectively. Because the body is damped by the foam, it won't vibrate as much, and it won't become fatigued so quickly. The foam can be cut to fit almost any body style. You'll still have to deal with plastic degradation that's caused by ultraviolet light and aging, but the protectors really work—even if they do look kind of, well, funny.

LINKAGE LOSS

These parts look pretty easy to assemble; in reality, they're the best way you'll ever find to insert plastic and metal linkage balls into rod ends and suspension arms. If you own an Associated pan car or an HPI or Kyosho Impress front end, you know what it's like to get those little metal and Delrin balls into the suspension arms. Sure, you can follow the directions and press them in against a flat surface, but it hurts the old thumbs. Judging by the condition of some of the balls I see at the track, it looks as though they've been squeezed with a pair of slip-joint pliers. The result is jagged edges on the edge of



This BRP tool comprises just three parts, but it works really well. Place the nut over the threads, place a ball over the screw, and slide the unit into the arm. Tighten the wing nut, and the ball pops right in!

the hole that goes through the ball. The edges catch on the kingpin as it slides up and down, and the suspension doesn't work as smoothly as it should.

Try this new BRP Products* tool. It's a 4-40 cap screw, a drilled-out nylon 8-32 nut and a 4-40 wing nut. Put the drilled-out nut over the screw threads, and place a ball insert on top of it. Slide the threads through the suspension arm or the ball link, screw down the wing nut and—pop!—the ball goes right where you want it. No muss, no fuss and no scratches—this is something I simply can't live without; it's a permanent part of my toolbox.

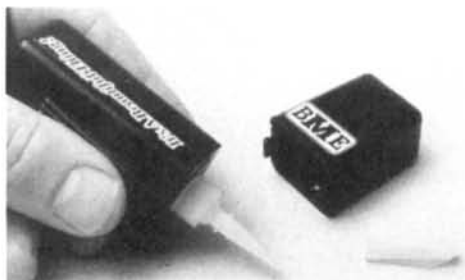


Inside this strange-looking case is a great container of CA.

GLUE-GOO

Do you use CA (cyanoacrylate) glue? If you run off-road cars and trucks, you probably use CA to secure tires to rims. Parking-lot fanatics use it to keep the treads on their cars, and carpet guys use it to repair tears and chunks in their foam tires and for emergency chassis fixes. Let's face it, without CA, the world would be a lot less fun.

On the other hand, I've probably put as much CA on my fingers and clothes as I have on the surfaces I've glued! My fingers have been stuck to so many parts that I had to



Take off the top, twist the cap, and squeeze the side tabs. The CA comes out in a controlled bead—not all over your hands.

come up with a variety of innovative ways to protect myself and to remove the shiny residue after a glue job—well, no more!

What you see here is an all-new way to apply that finger-stickin' stuff. It's made by BME*, and it's more than just a bottle of superglue. It comes in a container that keeps it fresh, and it has an applicator that keeps your fingers away from the glue. Pull off the top, and you'll find an inner cap that seals the applicator tip. Twist the cap, and the applicator tip is pierced to the proper diameter. Remove the cap, and squeeze the little finned tabs on the sides, and out comes the glue—slowly! It's so cool! I used it to glue a bunch of sets of off-road tires for the upcoming dirt season, and I didn't glue a single finger to a rim or get any glue on my table. It's truly a ground-breaking item!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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BSR Radials- 10th \$11.50 ea.
Feather Lites- \$13.50 & \$15.00 & FOAMS
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LUKE Juice Traction Compound \$5.95
RACEWAY Mfg / VANTAGE Eng.
BME Fiberglass Axles & Accessories
PROTOform Bodies / COBRA (C&M Mfg)
TECNACRAFT / RACETECH
FANTOM Handwound Modifieds
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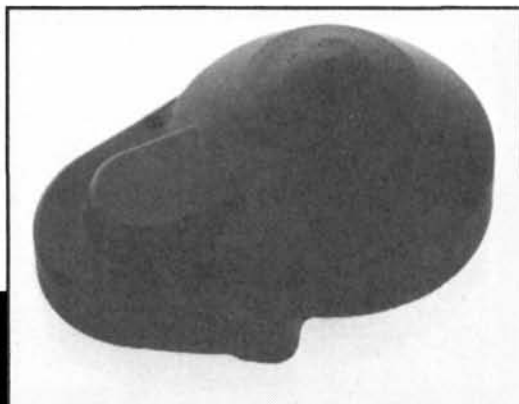
RPM

8018

RC10T2 Gear Cover (Slipper)

For the stock Slipper with an 87 or smaller spur. Molded in durable black nylon. Won't crack or split out. Large access hole with a soft plug for easy Slipper adjustment.

RETAIL
\$5.95



8022

RC10T2 Gear Cover (Hydra)



Extra clearance for use with the Hydra-Clutch and an 87 or smaller spur. Finish molded in black nylon. No trimming or drilling needed. Comes with mounting screws and our easy access soft plug.

RETAIL
\$5.95

RPM 14978 Sierra Bonita Lane, Chino, CA 91710.

Send \$2.00 for complete catalog and decals.



Hitec SP-560

EVEN IF YOU run a box-stock, entry-level R/C car, you're probably getting performance that was unheard of just a few short years ago. But two mods will transform your car: add ball bearings and replace the mechanical speed control with an electronic one (an ESC). Ball bearings reduce friction, and that makes a noticeable improvement. And ESCs tend to be more reliable and are easier to set up than mechanical ones; and, of course, their silky smooth throttle response allows you to drive a car with precision even in the worst conditions.

Hitec®; the name says it all. The Hitec SP-560 ESC is an ideal replacement for

a mechanical speed control. I planned to install it in my MRC MT-10S truck; I thought that they'd be a perfect match, and they were. The SP-560's on/off switch even fit the switch-mounting slot in the truck's chassis. I couldn't wait to check out this ESC in my "Scoping Out" lab; would it be worthy of my fine truck?

HIGH-TECH TREAT?

First, I just had to look inside the case. The servo-style mounting lugs are removable, so if you need to mount the SP-560 in a tight place with servo-mounting tape, you can do so. The innards are of the highest quality—a military-grade epoxy-glass printed-circuit board, bright, shiny solder joints and massive etch to carry a high current. The many miniature, surface-mounted components really save space. There was a little flux residue around some of the heaviest solder joints, but I doubt that this would ever affect an ESC's reliability.

The SP-560 has 12 FETs that share the forward/reverse chores. ESCs with reverse generally have higher "on" resistance than forward-with-brake controllers, and this resistance wastes power and makes an ESC overheat. Eight of the FETs are used for forward and four for reverse—a setup that will probably make forward strong at the expense of reverse.

This is probably OK, because you really need reverse only to back up out of trouble; and as we all know, readers of this fine magazine rarely—if ever—get their R/C vehicles stuck against a wall!

LAB LABORS TEST 1— RESISTANCE

Low resistance is one of an ESC's most important features; it means cool operation and faster speeds. With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

- Voltage drop along the full length of the battery wires and motor wires: 0.36 volt—a resistance of 0.03 ohm.

- Voltage drop 2 inches along the battery wires and motor wires: 0.19 volt—a resistance of 0.016 ohm (not low enough for serious racing, but it compares favorably with the figures I've obtained when testing other premium reversing ESCs).

TEST 2— OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps—the aver-

age current that a car would pull if geared for a 4-minute dump. The heat sink was in place, but there wasn't any cooling air.

After 15 minutes of this abuse, the SP-560's heat sink would have burned my hand if I had held it for too long, but it wasn't hot enough to cause thermal shutdown. Judging from the resistance I measured and the heating that I observed, the SP-560 should be able to withstand a modified motor and 4-minute gearing without suffering any ill effects—especially if it's mounted where it gets lots of cooling air and is allowed to cool between runs.

TEST 3— HANDLING A SHORT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. I shorted the motor wires, then I cranked the SP-560 to full throttle for 1 minute. The current jumped to a hefty 40 amps (the limit of my lab's power supply).

After a minute, the SP-560 was still working normally, but it was smoking hot, and grabbing the heat sink was definitely out of the question. It hadn't gone into thermal shutdown, though. The instruction sheet says that this occurs at 250 degrees Fahrenheit. This is obviously hotter than boiling water, so the controller can be way past hot enough to hurt my little pinkies and still be operating normally. Believe me, today's ESCs are rugged!

TRUCK STOP

It was time to mount the SP-560 in my shiny new MRC MT-10S truck and



WHAT IT HAS

- Reverse.
- 12 FETs—8 for forward; 4 for reverse.
- Built-in, automatic, thermal shutdown and protection against reversed battery connection.
- Built-in red/green pulse-checking LED.
- Three adjustment potentiometers: neutral, full speed, reverse delay.
- Massive heat sink.
- Two mounting methods: use the servo-style mounting lugs or servo tape.
- Full set of connectors: bullet-style motor connectors, Tamiya battery connectors, and a radio connector that's compatible with Futaba, JR, Hitec, Novak and Tekin receivers (or any receiver that uses a Futaba-compatible connector).

Of course, it has the usual instruction sheet, motor capacitors and adjustment screwdriver.



let the good times roll. First, I read the instruction sheet—only one page, but it told me all I needed to know and included a wiring diagram and mounting and setup details.

The "Additional Tips" section relates the need for a good flow of cooling air over the heat sink and for motor capacitors, which it tells you how to install. Something really surprised me: this section proposed what I consider to be the number-one ESC hop-up tip: improve performance by using short wires and racing-style connectors. As already described, my lab results showed a significant difference between

the resistance measured along 2 inches of wire and that recorded along the full length of the wires. The Hitec folks recommend that you hard-wire the motor wires directly to the motor and eliminate the bullet-style motor connectors. They also state that the SP-560 can be adapted to take other battery connectors; but you have to be able to make good solder joints. A sloppy or incorrect hookup job could easily destroy your pride and joy. If in doubt, *get help*.

I installed the SP-560 in my MRC MT-10S. I haven't had a chance to race the truck; most of my running is just knocking around a parking lot, and an ESC with reverse is ideal for this kind of running. (I'm bound to get stuck against the curb occasionally!)

INSTALLATION INFORMATION

My MRC MT-10S has a full set of connectors, so ESC installation was easy. I installed the SP-560 in place of the throttle servo, and I plugged in the battery and motor connectors. Finally, I bolted an on/off switch into the switch-mounting slot and plugged the receiver wire into channel 2. (Caution: the receiver connector isn't polarized; if you plug it in backwards, it doesn't hurt anything, but your vehicle won't run. To get this connector installed correctly, match its red-and-black wire to the steering servo's red-and-black wire.)

The last step is matching the controller to the transmitter, and the instruction sheet tells you how. The SP-560's pulse-checking LED—a two-color affair (red and green)—is a little different from some I've worked with. One might expect

that the green would be for forward and red for reverse, but both colors are related to forward. When the car starts to run forward, the green LED comes on; when the SP-560 achieves full throttle, the green LED turns to red. (A quick check with my oscilloscope verified that the LED is completely accurate.)

LET THE GOOD TIMES ROLL

With the SP-560 installed and several 6-cell battery packs charged, I headed to the track to give my MRC MT-10S a spin (accompanied by my 7- and 8-year-old grandsons, Kevin and Matthew).

I drove first to make sure that the Hitec-560 was operating well (and to impress the grandkids!). It was immediately obvious that the SP-560 is very strong: acceleration was strong, top speeds were fast, and run time was what I expected for the MRC MT-10S's gearing (6- to 7-minute dumps). But the big surprise came when I checked for overheating at the end of the run. The battery was warm and the motor was hot, but the SP-560 was barely warm. During a 6-minute run with a generous airflow over the heat sink, the SP-560 simply did *not* work up a sweat.

During the next run, I experimented with the reverse delay. When it was set to minimum, the car slammed between forward and reverse (allowing me to do 180-degree sliding turns—fun, but rough on the gears). With the setting at maximum, there's a 1-second delay before reverse kicks in, and this is the best mode to protect the old gear train.

I let the boys drive. They aren't seasoned drivers, but

the ESC's reverse allowed them to get out of trouble easily. The boys sure gave the SP-560 a brutal workout; they didn't even want to wait for a reasonable cool-down between battery dumps. Through it all, the SP-560 never missed a beat and stayed reasonably cool (proof positive that the heat sink does a first-class job).

CONCLUSION

The SP-560 is a very capable unit. It's very easy to install (thanks to detailed instructions and a full set of pre-installed connectors), and for a reversing controller, its resistance is low.

If you're hunting for the last drop of performance from an ESC, Hitec tells you, in detail, how to replace the stock connectors with racing ones.

The two-color LED pulse-checking system proved to be very accurate, and the adjustment pots had a wide enough range to allow the SP-560 to be matched to almost any transmitter.

You have to match the transmitter's forward/reverse to the SP-560. If your transmitter doesn't have a throttle-channel reversing switch, make sure that your transmitter trigger's travel matches the SP-560's forward/reverse before you buy it (especially necessary if you own a low-end stick radio).

If you need to replace a defunct mechanical controller or you want a reversing ESC for a super, scale project, give the SP-560 a test drive. You'll find that it's a very capable performer for a reasonable price.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■

SPECIFICATIONS

DIMENSIONS

Height (w/heat sink)	1.13 in.
Width (minus mounting lugs)	1.60 in.
Length	1.85 in.

WEIGHT

(w/wires and heat sink)	3.4 oz.
-------------------------	---------

LIST PRICE/WARRANTY

\$99.95/ none listed

TUNING

Access to controls	Good
Ease of adjustment	Good

MANUFACTURER'S SPECS

Max. voltage (7 cells)	12 volts
Min. voltage (5 cells)	6.0 volts
Max. current	800 amps
Continuous current	200 amps
Resistance	0.007 ohm

TEST RESULTS

Voltage	6 volts
Current	12 amps
• Voltage Drop	
—along length of battery and motor wires	0.36 volt
—2 inches along wires	0.19 volt

• Calculated resistance*

—along length of battery and motor wires	0.03 ohm
—2 inches along wires	0.016 ohm
BEC voltage (6-cell pack)	5.83 volts

*Resistance = Voltage drop ÷ current

COMMENTS: the SP-560's resistance is quite low for a reversing ESC, so it should easily handle a modified motor, and it can definitely handle a stock motor geared for a 6-minute dump. Reverse delay is a nice feature; it can be adjusted from 0.1 to 1 second—a range that covers everything. The SP-560 is a good performer at a reasonable price.



TEAM ASSOCIATED

RC10T2

by FRANK MASI

Racing the "Truckinator"

The T2 was tested over five weeks under rigorous racing conditions at two, rough, bumpy tracks. First, I raced it on two consecutive weekends at R/C Madness—an outdoor track in Enfield, CT. To make it challenging, head "madman" Chris Marcy is constantly changing the track's layout, and it gets really rough, especially as the race day progresses. The sandy dirt tends to become rutted, and after a while, big holes form in the corners. Also, the loose surface dirt always gets pushed to the outside of the turns, leaving the

underlying, hard-packed "slick" stuff right where the good lines are. To say the least, it's wicked-rough off-road racing that tests the limits of tie rods and suspension arms—and drivers' nerves!

ROCK 'N' ROLL TIME

I arrived at the R/C Madness track early so I'd be able to get some practice time. I spent my first pack trying to get the right lines around the track. Initially, I found that the T2 had lots of steering and that, in the softer dirt, I could swing the rear end around at

will. But I was sure that the track's condition would soon change, so I left the truck's setup alone.

The second practice run felt much more comfortable, and I was confident that the T2 would go where I wanted it to. This was going to be a good day! The real testament to the T2's smoothness came when I went out to practice with my 2WD buggy: "Man, where did that hole come from?" Evidently, the T2's suspension and tires had made a rough track seem smooth.

There were two full heats of modified trucks, and we ran three rounds of qualifiers. Here are my impressions:

- The T2 steers—I mean steers! It "drives" nice, round

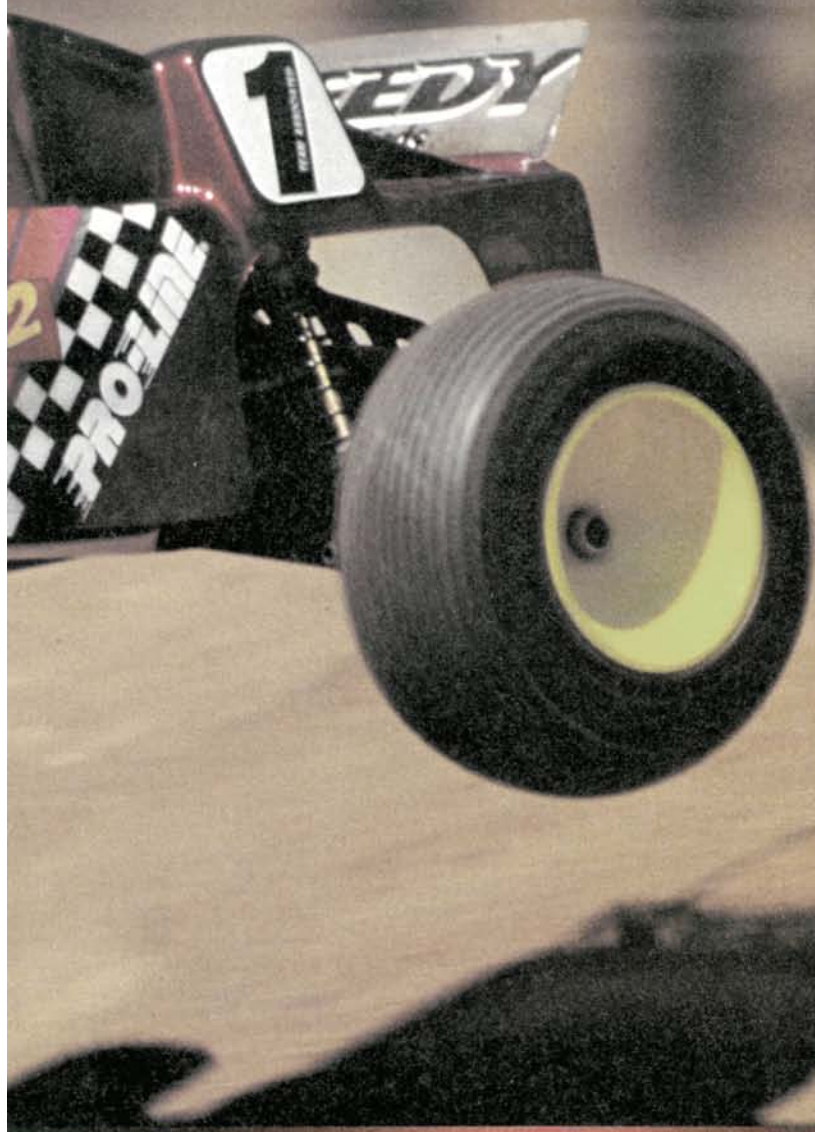
corners without "squaring off."

- It's very easy to drive in traffic because you can usually turn inside the other trucks without a problem. Once I got out by myself, "cruise control" driving was easy.

- It responds perfectly to braking: coming off a fast straight then tapping the brakes made it "suck in" nicely to the inside of the next turn without losing composure or stability.

- Most important, my laps became faster as the day went on, even though the track became more dry and rutted. This was partly the result of my getting used to driving the T2, but it was also because the kit's 8090 mini-pin rear tires worked better as the soft dirt was pushed out of the driving lines.

Choice Tracks



WHEN YOU HAVE a popular product, designing its successor is the hardest thing in the world. Team Associated* introduced its first electric R/C off-road vehicle—the RC10—in '84. Since then, "new" Associated buggies and trucks have all been variations on the original RC10 design. Not any more!

Associated's newest racing truck—the RC10T2—hits the ground running as an all-new, "clean sheet" design that shares only its shocks, a few small suspension pieces and its slipper clutch with the RC10. Using the latest computer software and with the aid of lengthy prototype testing, the T2 was designed to provide improved steering and better rough-track handling.

Associated claims that these goals have been achieved; in fact, the performances of many of their team drivers at some pretty big races have already substantiated this. How the T2 will perform in the hands of average racers, however, may be a different matter. With this in mind, I set out to test the T2 under realistic, club-type racing conditions to see whether it would live up to its manufacturer's claims. How did it do? You'll have to read the article, my friend!

PHOTOS BY JOHN HOWELL AND WALTER SIDAS

By the time the last qualifier had been run, the track was so bumpy that it was hard just to stay on course. At this point, I usually start messing around with setups, but I wanted to test the T2 set up according to the instructions, and anyway, I figured that the truck was working well enough, and I just needed to adjust my driving to suit the rough conditions.

I managed to land the TQ spot for the A-main, and at the start, I turned a pretty impressive holeshot into a lesson in perpendicular parking on the first turn. (Trust me, it's *really* embarrassing when you do this and you're the editor of an R/C car magazine.) At one point, I made it as far up as second place, but driver error again did its thing and I was relegated to a fourth-place finish (not a bad showing for a new rig, but like another "T2," I vowed, "I'll be back").

On the following Sunday, with the same setup, motor and tires, I put the T2 back in the pole position for the "A" (it does look pretty snazzy there!). Chris had redone the track; it was longer and even rougher!

This time, I didn't blow my start and got around the first few turns cleanly,

allowing only one truck to pass me. With this particular track design, the T2 had a bit more difficulty with the bumpy sections. I found it more difficult to gain ground on the lead truck, because the kit's softer, green, front springs tended to drop the T2's nose into the ruts, and the rear shocks' no. 2 pistons had a bit too much pack to handle the smaller, sharper bumps.

Regardless, the leading truck's driver made a mistake that allowed me to slip by and win. After only two races with a brand-new truck, I had managed to TQ twice and win once. I was really impressed, but after that, I wanted to work on a rough-track setup.

TRACK TESTS, PART 2

I raced the T2 three more times at JP's Hobbies—an even rougher track in Seymour, CT. First, I ran the stock setup, then I changed to Pro-Line 8092 Fuzzie-T tires (in M2 compound) in the rear. These seemed to make the truck much more stable through the ruts, and they provided better acceleration.

JP's track starts off nice and smooth, but it gets so torn up by the cars and trucks that, by the second round of qualifying, it's almost impossible to find a

smooth section. The T2 handled the rough stuff pretty well; it bounced a lot over the ruts, but no more than any of the other trucks did. Despite this, it wasn't difficult to maintain consistent lines around the track.

By the following weekend, I had changed the T2's setup completely (see "Rough-Track Setup" in the "Building and Setup Tips" sidebar) to accommodate the bumpy track. What a difference! The no. 1 pistons in the rear shocks allowed the rear suspension to move much more quickly than before over the smaller, sharper bumps. As a result, the back of the truck seemed much more "planted," and using the same Fuzzie-T tires, rear traction seemed better. Combined with the slightly firmer silver springs, the no. 2 pistons in the front shocks provided adequate steering, but most important, they allowed the front end to soak up high-speed bumps better. When the T2 did bounce, it stayed level; neither the front nor the rear became "squirrely."

On the T2's fifth week of tests (and its third time at JP's), the crew had changed the track's layout and had added a huge tabletop jump. Because the dirt had been freshly raked and was

somewhat loose, I swapped my rear tires for step-pins. The T2 was instantly "dialed" to the new track, except for the tabletop, where it bottomed out severely on landing. This condition was absolutely caused by my use of pistons with larger holes in the shocks. My solution? Instead of changing the setup, I rolled the jump and accelerated down its back side. Occasionally, I was forced to grab huge air to pass a rival truck (when crazy, midair passes work, it's the coolest!), and the T2 flew terrifically, but the loud "smack" when it landed kept reminding me that I didn't have any spare parts with me! If I were to tune the T2 to handle this large jump, I'd probably go back to the original rear shock setup (no. 2 pistons with 25WT shock oil).

When the dust had finally settled after the T2's rigorous testing schedule, it had made it to the pole position in all five of its outings. It had won twice, and I think that, if it hadn't been for driver error (mine!), it could have won all five. Not bad for an out-of-the-box truck!

RC 10 T2

• Rear suspension

The bulkhead is much lighter than the old truck's, and it's made of the same composite material as the suspension arms. To strengthen the rear of the chassis, the bulkhead is tied in to the tranny case and to the chassis sides. The rear arms, 1.32-inch-stroke shocks (with hard-anodized, Teflon-coated bodies) and black fiberglass shock tower combine to form a rear suspension that's designed to work better on bumpy tracks and allow better acceleration.

• Transmission

An all-new configuration that features a lower center of gravity (CG). A differential with a larger diameter means you can go longer between rebuilds because there's less strain on the diff's parts. The tranny has a low, 2.6:1 reduction ratio, so you can use hotter modified motors. In addition, this low ratio lets you set the slipper more loosely for better control on slick surfaces. Associated's ATC slipper clutch is standard.

• Rear wheels and tires

The T2 comes with Pro-Line's 8092 mini-pin rear tires in super-soft XTR-M2 rubber compound. Foam inserts come with the tires. The one-piece rear wheels are molded out of fluorescent-yellow

nylon. Unfortunately, because of the new axles, only wheels specifically designed for the T2 will fit; you won't be able to use your old RC10T wheels.

• Drive shafts

Newly designed and made out of an improved grade of steel, they're stronger and lighter than the shafts used on the RC10T. Their axles have smaller diameters, so stronger, more reliable $\frac{3}{8} \times \frac{1}{8}$ -inch ball bearings can be used.

• Battery brace

A unique way to secure the battery, this molded brace is anchored to the rear suspension bulkhead and fits over the pack. Small molded arms toward the rear of the brace prevent the pack from shifting from side to side, and a bolt-on "stop" allows the use of both 6- and 7-cell packs.

• Steering bellcranks

These incorporate an adjustable-tension servo-saver, so you can use a simple, rigid steering arm on your servo. The length of the center drag link is adjustable, so you can vary steering Ackerman (the relation of the angles of the left and right front tires during cornering).

• Chassis

Stamped out of 2024 aluminum then hard-anodized, the T2's chassis is both stronger and lighter than that of the RC10T. The chassis undersides are angled upward to increase ground clearance when the truck corners and when it lands off a jump. The rear of the chassis has a small, square hole in it through which the bottom of the tranny case passes. This allows the diff to be installed lower for a lower CG.

• Servo mounts

Associated has finally replaced its old "block of nylon" servo mounts with these new, molded mounts, which are much lighter and feature pre-drilled holes.

• Front wheels and tires

One-piece, molded, fluorescent-yellow wheels with Pro-Line 8095 "The Edge" front tires in XTR rubber compound.

• Front suspension

Designed to improve steering response. Hard-anodized, Teflon-coated shocks with 1.02-inch-stroke shafts are attached to a thick, black, fiberglass shock tower. New, black suspension arms are molded out of a lighter, stiffer composite. The steering arms have aluminum, in-line axles, and Associated's 30-degree caster blocks are standard. For easy suspension adjustment, steel turnbuckle linkage is used throughout.

Building and Setup Tips

• In step 2 of the instructions, you're told to place two no. 4 aluminum washers between the long ball end and the nylon steering blocks. Doing this raises the ball end off the steering block and minimizes bump-steer. Using just two washers, you still get a little additional toe-in when the front suspension is compressed. By adding a third washer, you'll eliminate bump-steer almost entirely.

• Take your time when building the suspension. Make sure that all of the arms operate freely without binding. When built properly, the suspension arms should "drop" under their own weight when you raise them (without the shocks or wheels attached). If binding occurs, ream *only* the arms using an 1/8-inch straight reamer, or slowly run a 1/8-inch drill bit through them (preferably by hand).

• When assembling the steering bellcranks, be sure that the center drag link is of the proper length. To check this, install the bellcranks on the chassis; they should be parallel to each other. If they aren't, adjust the link's length. This adjustment is critical because it affects the truck's steering. More experienced drivers may wish to experiment with this adjustment because it controls the steering's Ackerman effect.

• Heed Cliff Lett's advice: use lots of the black grease on the differential's thrust bearing assembly!

• Installing the roll pin in the tranny's top shaft is a pain! Do yourself a favor and lightly chamfer (bevel) the edges of the roll-pin hole using a sharp X-Acto knife.

• I recommend that you use Aero Car's® Super Speed gear and diff lube on the tranny's internal gears, but don't use it on the differential. This stuff really quiets the tranny and seems to make the gears last longer.

• Don't get any grease or oil on the slipper-clutch pad or the slipper plates! This is very important; if grease gets onto them, you'll never stop the thing from slipping excessively.

• Using a sharp hobby knife, take the time to carefully trim all the flashing (excess material left after molding) off the shock-seal parts. When building the shocks, use RCPS®

Green Slime shock-seal lubricant; it really does make a difference. Lubricate the shock shaft with shock oil (of the type you'll use to fill the shocks) before *carefully* inserting the shaft through the shock seals. I accidentally tore a seal and had to rebuild a shock "in the field."

• Glue the tires to the wheels!—and do a good job. The importance of securing the tires is often overlooked. I like Pacer's® Zap-a-Gap (the green-label stuff) with Zap's Z-Ends applicator tips.

STARTING SETUP

Whenever I test a new racing machine, I always start with the recommended setups. If they don't work "A-main fast" in stock form, I'll make minor changes to, for example, the shock oil, pistons, or tires. Here's the starting setup recommended by Team Associated:

- Front shocks—no. 3 pistons; rear shocks—no. 2 pistons; all four shocks—25WT silicone oil and Associated's green springs (no. 7036, front; 6480, rear).
- Front and rear wheels—3 degrees of negative camber; front tires are set straight ahead (no toe-in or toe-out when viewed at normal ride height with the battery installed). The kit's 30-degree front-caster blocks are used.
- Rear toe-in: 3-degree rear arm mounts with 0-degree rear hub carriers. The wheel-base spacers are behind the hub carriers so

that the truck's wheelbase is as short as it can be.

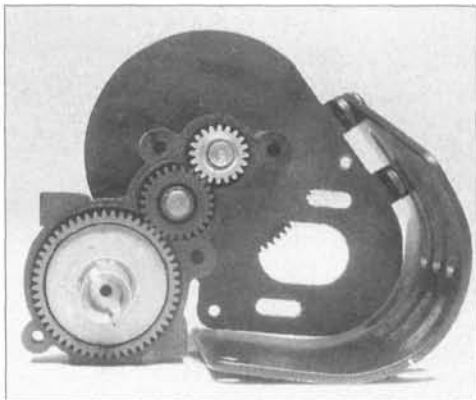
- Ride height is set so that the rear drive shafts are level with the ground, and the front end is just *slightly* higher than the rear. To assess ride height, drop the truck from a height of 6 to 8 inches and see where it comes to a rest. Always measure ride height with the truck in ready-to-run form (battery and body installed).
- Initially, I used only the tires that came with the kit: Pro-Line's® no. 8095 "The Edge" fronts in XTR compound and

8090 mini-pin rears in the new, softer, M2 compound.

ROUGH-TRACK SETUP

With every T2 kit, Associated supplies a handy setup sheet on which there are suggestions that will improve handling on rough tracks. Here's Associated's rough-track setup with a couple of minor variations:

- Rear shocks: switch to no. 1 pistons and fill with 30WT silicone oil. I drilled out one of the piston holes to make it



The T2's new tranny has a larger diff gear, a two-piece motor-mounting plate, and a "laid-down" design for a lower CG. When assembled, the tranny case is attached to the truck's rear-suspension bulkhead to strengthen the chassis.

slightly larger and filled the shocks with 35WT weight oil. Use green springs.

- Front shocks: switch to no. 2 pistons and fill with 30WT silicone oil. Use Associated's silver front truck springs (7428). You really don't want to use no. 1 pistons up front because they'd tend to make the front suspension bottom out easily; jumping ability would also suffer.
- I installed a small, 1/32-inch-thick metal washer between the rear suspension-arm mount and the chassis. The washer goes over the rearward screw that secures the mount, and it slightly reduces rear-suspension arm anti-squat. With this addition, the truck's rear suspension handles the bumps a little better, but acceleration is diminished.
- On bumpy tracks, try to avoid using front-wheel toe-out. The extra turn-in you'll get by doing this isn't worth sacrificing stability through ruts.

Another trick for rough tracks is to move the rear toe-in from the arm mount out to the hub carriers by using Associated's 0-degree rear arm mounts and 3-degree rear hub carriers. I haven't tried this yet, but it's the next mod on my list.

Test Gear

I used my new Airtronics®

Caliber 3PS to deliver the signal to a Novak

NER-3FM. I also used an

Airtronics 94737 steering servo

because I like its blend of torque and speed; it isn't ultra-fast, but it has more than enough torque to guide a truck.

S&K Racing® now imports the M-Troniks® line of ESCs. Their new 900 VHF ESC switches at a dizzying 7500mHz and features "anti-lock" braking.

After reading its specs, I was eager to try one in the T2.

For power, I used a Reedy® Sonic M (large comm; 13-turn double-wind) motor geared 18/87. Throughout

the tests, I used 6-cell matched packs of Sanyo 1700mAh SCRCs from Reedy, Trinity® (World Tech cells) and DC

Enterprises®—all equipped with Litespeed® Super Cons connectors.

Can a Sequel Equal the Original?

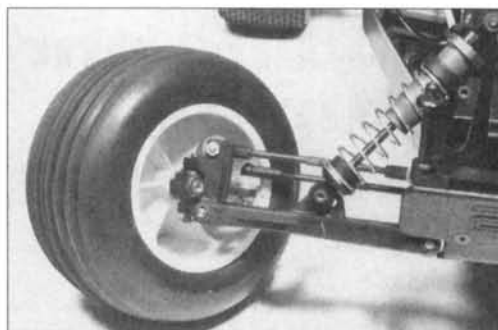
What do I think of Associated's first, "all-new" design since the release of its RC10 back in '84? Stellar! It's better than the RC10T in every way. It looks new, yet its aluminum-tub chassis and handsome body shout "traditional Associated."

The biggest difference between the T2

and the RC10T is in the steering department. The T2 turns almost as quickly as a much lighter and smaller buggy, and its balance through the turns is superb. In addition, I've noticed that the T2 has less tendency to lift its front end under acceleration; the 10T seemed to do this a lot.

The T2 offers fewer tuning options than many of its competitors, but I think that most owners won't notice the absence of additional camber-rod or shock-mounting locations. You could subscribe to the notion that there aren't

many suspension-geometry options because of



The T2's raked front arms are molded out of a lighter, more rigid composite. The shocks are carryovers from the RC10T, but they're mounted on a new shock tower that provides improved suspension geometry.

Associated's extensive testing; they've included only the settings that work best under most track conditions. You'd probably be correct.

The new truck's looks, its technology and the quality of its parts show what we can expect from future Associated products. During five weeks of tests and having

about 60 battery packs run through it, the T2 came out shining—not one broken part. Overall, the T2 is a worthy replacement for the RC10T; it's an easy-to-build, great handling truck with class-leading steering capabilities.

**Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■*

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$365

DIMENSIONS

Length (overall) 15.625 in.
Wheelbase 11.125 in.
Width (F) 12.375 in.
Width (R) 12.50 in.

WEIGHT (RTR) 4 lb., 1.8 oz.

CHASSIS

Type Stamped tub w/angled undersides
Material Hard-anodized, 2024 aluminum

DRIVE TRAIN

Type Sealed gearbox, 2.6:1 ratio
Primary Molded spur gear/steel pinion gear
Transmission Steel, universal-joint drive shafts
Differential(s) Large diameter, fully adjustable ball diff

Slipper clutch Friction-type, external
Bearings/bushings Sealed ball bearings

SUSPENSION (F/R)

Type Fully independent; lower arm w/upper camber link
Damping Hard-anodized, Teflon-coated, oil-filled shocks; coil springs

WHEELS (F/R)

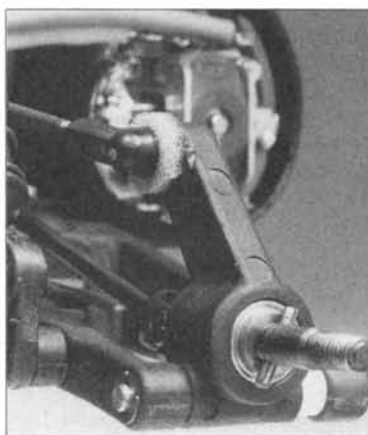
Type One-piece molded fluorescent yellow
Dimensions (DxW) 2.2x2 in.

TIRES

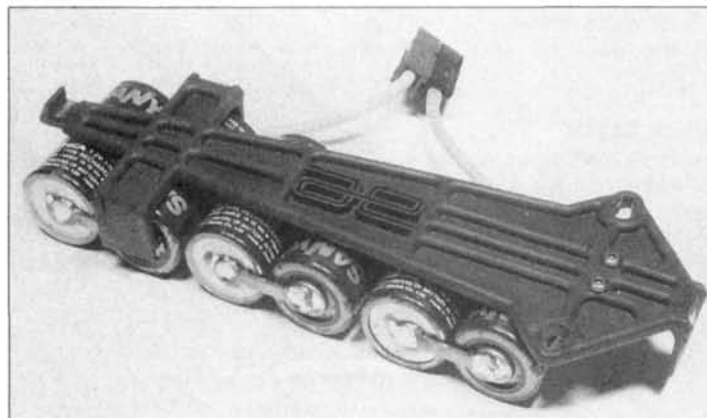
Front Pro-Line 8095 "The Edge" in XTR compound
Rear Pro-Line 8092 mini-pin in M2 compound

ELECTRICS

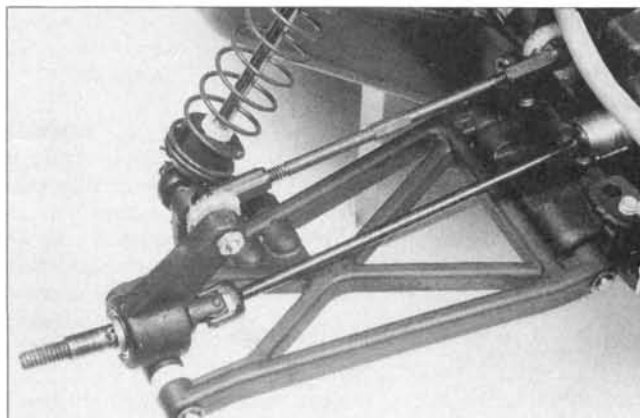
(motor, battery, ESC) Not inc.



The spacer on the rear hub carrier's hinge pin allows subtle adjustments to be made to the truck's wheelbase. Note the new drive shafts and the use of larger-diameter, 3/8x3/16-inch new, unflanged bearings, which should improve reliability quite a bit.



This neat battery brace holds the pack securely and can easily accommodate 6- and 7-cell packs. The rear of the brace is "keyed" to the truck's rear bulkhead, and two posts hold the front.



The T2's rear suspension geometry was designed to improve rough-track handling. The new stronger, lighter drive shafts are said to be more efficient than the older ones.



LOTS OF FUN
in a
tiny
PACKAGE

Tamiya Mini Cooper

by Stan VanDruff



SPECIFICATIONS

SCALE	1/10
LIST PRICE	\$218
DIMENSIONS	
Length overall	12.25 in.
Wheelbase	8.25 in.
Width (F/R)	6.25 in.
WEIGHT (gross, RTR)	2 lb., 13 oz.

CHASSIS	
Type	Deep, molded tub
Material	Plastic
DRIVE TRAIN	
Type	Sealed gear
Primary	Pinion/spur
Transmission	Gear
Differential	Bevel gear
Slipper clutch	None
Bearings/bushings	Plastic/bronze bushings

SUSPENSION (F/R)	
Type	A-arm with upper link
Springs	Coil-over
Damping	Friction damper
WHEELS (F/R)	
Type	One-piece plastic
Dimensions (DxW)	1.5x0.875 in.
TIRES (F/R)	Street tread

IT WAS LOVE at first sight. Rarely do I see a kit that I just have to buy, but the Tamiya* Mini Cooper is definitely one of those kits. Last year at the Chicago Hobby show, I fell in love with the prototype and could barely wait until Tamiya started production. Words alone can't convey the appeal of the Mini Cooper, but everyone has the same reaction when they first see it.

Even the full-size Mini Cooper—all 10 feet, 1 inch of it—is so appealing that it has been in production for 35 years! In the fall of 1959, the BMC (now Rover) Mini began as a strictly utilitarian four-seater. By 1963, world champion Formula 1 builder John Cooper convinced BMC to produce his souped-up Mini (which he had modified with Formula Junior parts). Since then, the Mini Cooper has been endowed with disk brakes, a high-performance engine, aggressive handling and more.

The Mini Cooper is popular throughout Britain and has a small but loyal following in the U.S. It's small and maneuverable with plenty of power, and it's overloaded with charm. But an owner has to be willing to spend weekends under the hood to keep everything humming.

KIT FEATURES

The Mini Cooper has Tamiya's typical high-quality engineering and construction. Its new chassis is fast and easy to build

quickly. I leisurely completed the kit (except the paint job) in one evening.

The unique chassis is symmetrical, and the front and rear suspension assemblies share many parts. The stock Mini has front-wheel drive with front-wheel steering. Swap four body posts and reverse the motor, and you'll have rear-wheel drive with rear-wheel steering; with just a little more work, you

can have rear-wheel drive and front-wheel steering.

If you're willing to invest in a few extra aftermarket parts, you can have four-wheel drive, two- or four-wheel steering and dual motors! Although you don't need any of this crazy stuff to enjoy the Mini, it's fun to think about.

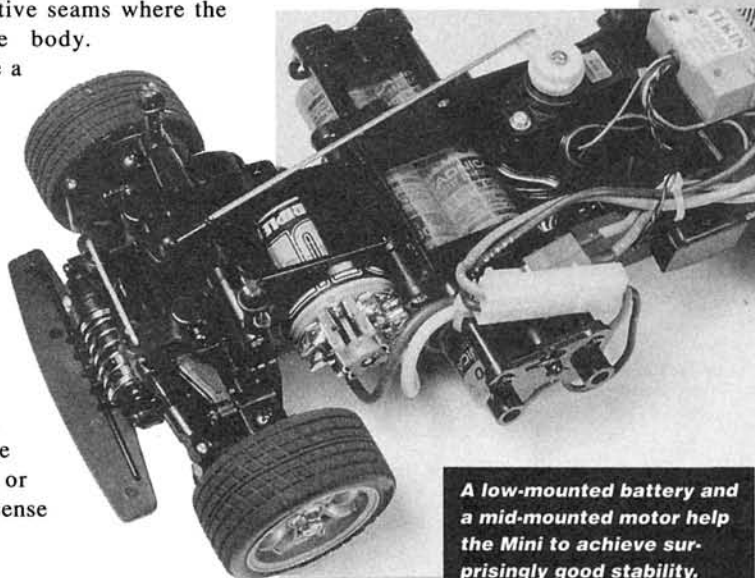
Ever wanted a rear-wheel-steering car? Now you can have it with the Mini Cooper!

The Lexan body is a work of art. It has molded-in fender flares, realistic lights and the Mini's distinctive seams where the fenders join the body.

Accessories include a chrome grill and bumpers, mirrors and very realistic decals for everything from the taillights to the window molding. Silver eight-spoke wheels look just like those on late-model Minis. You even get your choice of European- or American-style license plates.

TEST GEAR

Tamiya supplies a 540 motor and a 3-speed mechanical speed control; they give the Mini adequate performance, but the full-size Mini Cooper has better than adequate performance. Minis are popular for British road racing, so it's common to find them with really hot engines under their hoods.



A low-mounted battery and a mid-mounted motor help the Mini to achieve surprisingly good stability.

likes 

- Incredibly cute.
- Easy to build.
- Fun and easy to drive.

dislikes 

- Sloppy steering.
- Low-performance shocks.

Because the hottest motor I had lying around was a Trinity* Ruby 16-turn triple, that's what I installed.

I prefer a forward/reverse controller in a scale car such as the Mini, but I didn't have any that could handle the power of the modified motor. I settled on a Tekin* Sport TSC 408 electronic speed control. An Airtronics* Caliber 3P radio with an ordinary 94102 steering servo rounded out the electronics.

PERFORMANCE

The Mini's performance was a pleasant surprise; in fact, it was much better than I had expected. The car has a very low center of gravity, and the battery (which hangs below

the bottom of the body) and motor provide good balance and plenty of traction for the front wheels. Unfortunately, the suspension is like something from the Model-T era.

The stock friction damper is too stiff, and the steering is sloppy. There's so much

FACTORY OPTIONS

- 16- and 18-tooth pinions let you match your motor to road conditions—part nos. 50354 and 50355.
- Aluminum damper set will improve handling over bumps—53155.
- Universal-shaft set provides smoother power transfer to the wheels—50205.
- Ball-bearing set provides greater speed and longer battery life—53206.
- Manta Ray Ball Diff endows the Mini with even better cornering ability—53070.

TAMIYA MINI COOPER

play in the steering that putting the modified motor at full throttle causes serious wheel hop. Even gently applying the throttle causes one wheel or the other to hop madly when the Mini hits top speed.

My friend David Doerr showed me a low-budget trick to tighten the steering; simply stretch a rubber band between the steering arms (see photo below). Although

THINGS YOU'LL NEED

- 2-channel radio system
- Steering servo
- Second servo or ESC
- Battery pack(s)
- Battery charger
- Lexan paint for the body

it isn't a perfect solution, it's a big improvement. I tested the Mini on a smooth asphalt road. As long as I didn't apply too much power, it performed beautifully. I also found that the Mini's tall body belies its ground-hugging ability. Its short wheelbase gives it a short turning radius. Even though the suspension allows excessive body roll, the Mini can corner sharply without rolling over. I didn't notice any tendency to push or slide in the turns either.

Don't think about driving in the grass or on gravel. The Mini has so little ground clearance that it gets hung up in even the shortest grass; and when it hits a piece of gravel, it jumps like a jackrabbit.

Building and Setup Tips

Assembly is a piece of cake. Just leave the body posts a little longer than the instructions recommend. The rear of the body is about $\frac{1}{4}$ inch too low, and the front should be raised $\frac{1}{8}$ inch for better tire clearance.

Over the years, the Mini Cooper has been available in several two-tone paint schemes: Old English White with a black roof, Tartan Red with a black roof, Island Blue with a white roof and Fiesta Yellow with a white roof. No color, however, has been more popular than the traditional British Racing Green with a white roof. If you prefer this conservative color scheme, you'll have to mix your own green (Pactra® Rally Green with a little black comes pretty close).

FINAL THOUGHTS

On the surface, the Mini Cooper looks like a tame sedan—one that a little old lady might drive on Sundays. Beneath its calm exterior, however, there's a well-balanced, short-wheelbase chassis that's a blast to drive. Its good-looking body faithfully reflects the charm that has attracted full-scale Mini buyers for 35 years.

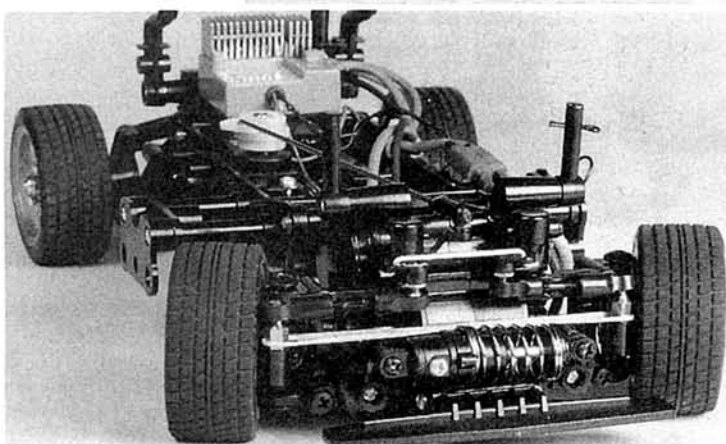
I liked the extra scoot from the modified motor, but the 16-turn triple I installed was serious overkill. Something with 20 to 21 turns would be more reasonable and wouldn't be as likely to destroy the tranny.

The kit is very

easy to build and is suitable for a beginner. It's the first car that my wife really enjoyed driving. She kept saying, "It's your turn, honey," but she never actually let go of the transmitter until the battery died. If you want to get your significant other involved in R/C, get a Mini Cooper, and they'll be hooked.

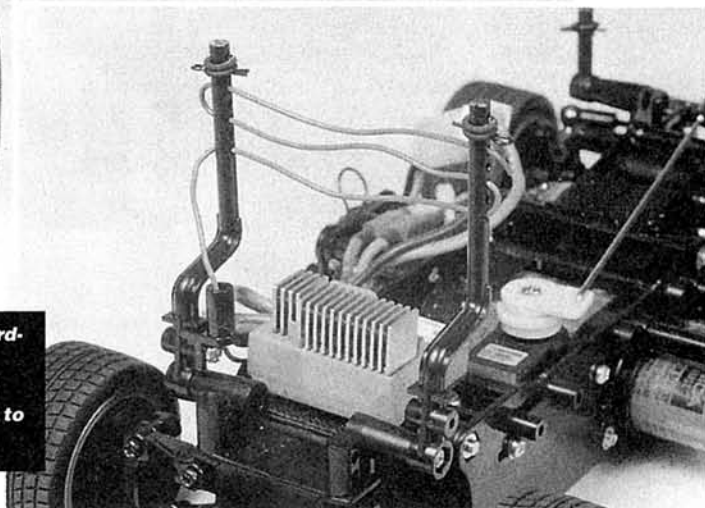
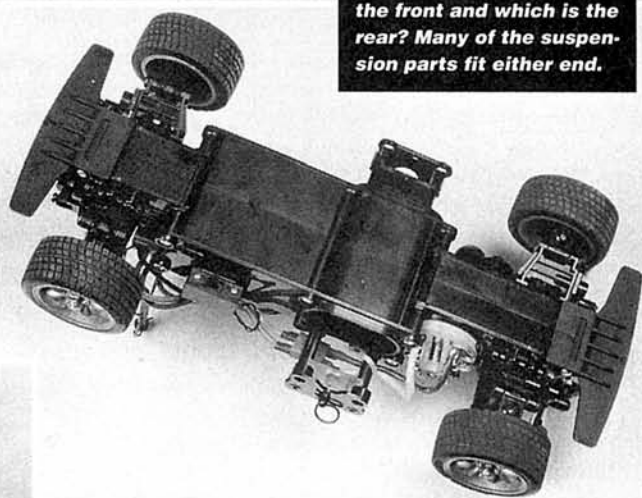
**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*

Can you tell which end is the front and which is the rear? Many of the suspension parts fit either end.



The low-cost friction damper is the weakest part of the kit. A rubber band takes some of the play out of the steering.

I cut the body posts according to the directions, but that left them too short; I added a couple of O-rings to raise the body a little.





SCALE1/12
LIST PRICE...\$330

DIMENSIONS

Length (overall) ..11 in.
Wheelbase.....7.8 in.
Front width6.5 in.
Rear width6.6 in.

WEIGHT (gross, RTR
w/4-cell pack)1 lb., 13 oz.

CHASSIS

Type.....Single plane
Material.....Fiber-reinforced graphite

DRIVE TRAIN

Type.....Direct drive
Primary.....Pinion/spur
Transmission.....None
Differential.....Ball diff

Slipper clutchNone
Bearings/bushingsBearings

SUSPENSION

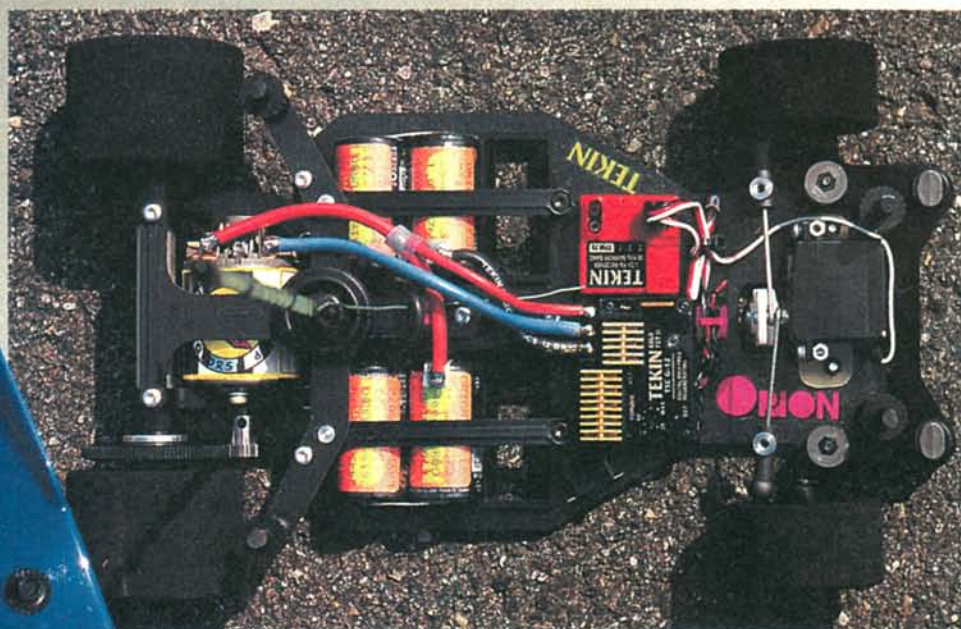
Damping (F)Coral anti-roll beam
Silicone-damped O-ring
Damping (R)Full-floating pod on
captured rocker balls and
T-bar; silicone syrup-filled bladder

WHEELS (F/R)

Type.....Nylon, 1 3/8-inch-diameter

TIRES

FrontSilver Star medium-
compound foam
RearGold Dot soft-compound foam



PHOTOS BY DOUG MERTES

CORALLY SP12GII

by
Doug
Mertes

Worlds Winner

WOULD YOU BE EXCITED if you discovered that you could buy a 1/12-scale, on-road car just like the one that won the World Championship in 1994? Skeptical? What if I told you that it is truly identical? OK, OK; how about if the car comes fully assembled by the company that put together that championship-winning ride? Is this beginning to sound interesting? I thought so!

Last year, Corally driver David Spashett took the on-road world by storm. He came in second to Masami Hirotsuka in the 1/10-scale World Championship and was victorious by such a large margin at the 1/12-scale IFMAR World Championships in France, that it seemed as if the other drivers in the triple A-Main were racing in another class. I saw a video of those three Mains, and it's simply amazing to watch Spashett pull away so quickly and so easily from Masami, Joel Johnson and the rest of the field. His impressive driving skills are equally matched by his equipment.

The cars that Corally (distributed here by Du-Mor*) designs and sells have so many unique design features, manufacturing and assembly techniques and tuning options, that you really have to take the time to study the tuning manual before you even put the car on the carpet.

SPECIFICATIONS

I had a chance to test one of these world-championship-level Corally SP12GII 1/12-scale cars, and let me tell you, it's an experience I won't soon forget! What is it about this car that makes it so desirable? Let's take a look and see....

KIT FEATURES

One reason that experienced racers are willing to pay a premium price for Corally equipment is that there's practically nothing else you have to buy: no options, "unobtainium" parts, or go-fast goodies are needed to be competitive. This latest Corally 1/12-scale terror comes with a beautifully cut graphite chassis, a fully floating rear pod with sealed bladder damper, the newest "roll-control" front-suspension design, a built-in battery-securing system, mounted and trued natural-rubber tires, center-point steering linkage, body posts that secure the body with innovative plastic top-hat nuts, ride-height adjusters and a full set of ball bearings. The chassis is even pre-drilled for the included servo mounts, and it comes

sides of the front end remain at a more or less equal height, the chassis can't overcome its roll center and the car corners with a very flat attitude. At the same time, compressing the suspension reduces front caster, so the car retains speed coming out of the corners. It's a very simple design, and it really works! Front suspension damping is accomplished with an O-ring-filled disk that rides on the spring post. You can easily adjust damping action by using damper syrups of different viscosities on the ring and post (the manual recommends hard syrup no. 80001, but shock fluid works well, too).

TEST GEAR

I used electronics that did the performance level of the rolling chassis justice: a new ultra-high frequency Tekin* TSC G-12 electronic speed control with torque-limiting adjuster, a matching Tekin TFM-75 miniature receiver, a Futaba* 9601 steering servo with a Kimbrough* small servo-saver and a Race Prep* Epic-based, 12-turn dou-



with its own fiberglass rollover antenna!

The Corally starts with a fully tunable rear flex-plate that feels very stiff and resistant to bending, but still provides adequate traction, even on slippery tracks. That's because it's "fully floating" from side to side; there's no tweak to adjust on these cars. By moving the flex-plate mounting points forward or backward, you can increase or decrease the rear traction. If there's still too much traction with the settings at their firmest, use Corally's Tweak Adjuster (part no. 752043) in place of the front radio-tray post. It has three holes on each side that allow you to dial out even more traction—pretty cool stuff!

Front traction is controlled by tire type and compound, and by the amount of traction additive applied to the insides of the front tires. The front suspension is designed to reduce chassis roll; a U-shaped plate made of a special aluminum compound called "Coral" connects the front wheels. When one side of the front suspension is compressed, e.g., when the car enters a turn, the other side is also compressed, although to a lesser degree. Because both

ble modified motor (no. RP905-122). To supply the juice, I installed a four-pack of Orion's* top-level Sanyo SCRC 1700mAh Ni-Cds. For a transmitter, I used my handy-dandy JR* 756 FM radio. With memory storage for up to six models, it handles almost all of my radio needs.

David Spashett used a PK Nissan body to win the Worlds, but I wasn't able to locate one of those. Instead, I took the advice of Chris Morris at Du-Mor and painted up a Protoform* Nissan P-35 body using Pactra* polycarbonate spray paint in cans. The body covers the lines of the chassis like a glove, and its smooth, sinuous shape is truly eye-catching! The decals come from an assortment of McAllister* and Tamiya* sheets that I had in my decal files. This body really stands out on the track!

Building and Setup Tips

The Corally SP12GII comes fully assembled from the factory, where they do an awesome assembly job. All of the bearings are fully seated, the front and rear suspension assemblies are properly adjusted, and everything is ready for you to install the electronics of your choice. I added a few goodies as well: steering blocks with ball-bearing-supported kingpins for ultra-smooth handling (part no. 75794) and a light aluminum screw set (no. 76072) that yanks 12 grams off the car's overall weight.

To mount the steering servo, I had to make one part. The chassis was drilled for a Futaba S132H servo, but I elected to use a smaller, lighter 9601. The case was just too narrow to fit over the cutout in the front of the chassis. I made a small servo-mounting plate out of a scrap of thin G-10 fiberglass (an old, broken T-bar!), attached the servo to it with the Corally mounting posts and then screwed it to the chassis using the factory-drilled holes. It's neat and solid.

You get an ample supply of spare, plastic "C-clips" that hold the wheels and suspension parts together, hardware for the servo mounts, ride-height adjuster sockets for the rear axle and a nifty Torx screwdriver for all of the flat-head screws. Front ride height is set by juggling the placement of washers above and below the steering blocks, so you never have to worry about finding the correct front-height adjusters. All of the little parts that are unique to the car can be carried in one of those plastic motor boxes that you get with stock motors.

Things You'll Need

- Electronic speed control (make sure it will work with four cells, if that's what your club class runs)
- Receiver and transmitter
- Small steering servo
- 4-cell or 6-cell saddle-style battery pack
- Stock or modified motor
- Battery charger (again, make sure it will charge 4-cell packs, if that's what you use)
- Pinions for the Corally car

■ T-bar adjuster—part no. 752043

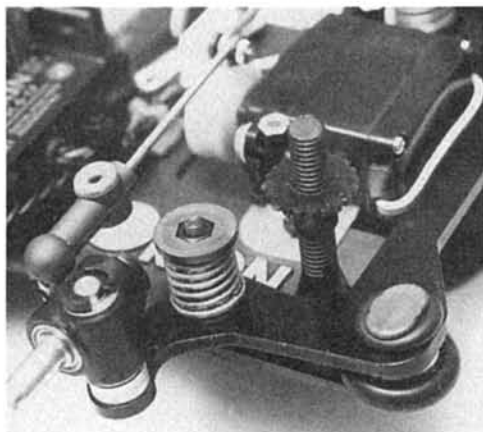
■ Aluminum screw set—76072

- Ball-bearing steering blocks—75794
- Du-Mor 48- and 64-pitch pinion gears (you must use a pinion gear with an extended shaft) and spur gears in various tooth counts
- Silver compound (harder) mounted and trued tires 14517 (front); 14507 (rear)
- Hard front springs—75572
- Wing-mounting posts—75951
- Graphite T-bar—752030

Factory Options

PERFORMANCE

The SP12GII is the latest in a long line of competent and highly competitive Corally 1/12-scale cars, and it was designed specifically for longer race meetings with many participants. When many racers use the same driving lines on one carpet track over several days, the track gets stickier with each heat. The really fast guys keep dialing traction out of their cars because too much traction makes you slow—especially through the turns. That's where the tires leave the most rubber dust and tire compound. When that happens, you'd better be able to precisely adjust the rear traction and balance of your car, or you're dead meat!



Incorporated in the front-suspension design are adjustable ride height, anti-roll, silicone damping and reactive caster.

I tested the Corally SP12GII on a narrow, twisty, Ozite carpet 1/12-scale track, and it handled well from the moment I put it down. This car makes you look like a pro—smooth, confident and in control. With a little practice and dial-in time, you'll be running tight lines and consistent lap times. It's just that easy to drive this car well.

Likes

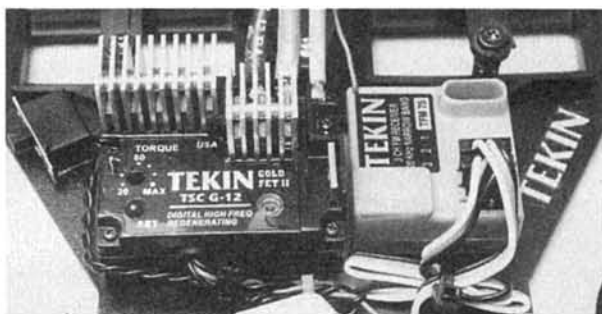


- High-quality parts have been assembled correctly, which means more time running and less time building.
- Handles like a dream.
- Front-end design yields faster cornering and lower lap times.

Dislikes

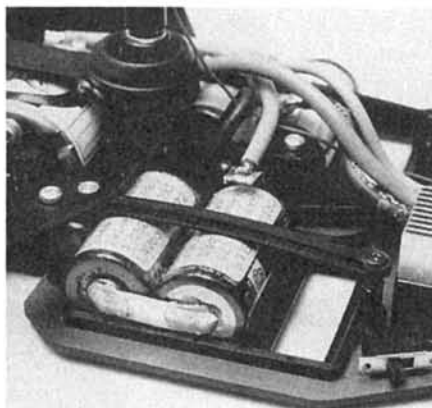


- Design of rims and motor pod required that I buy pinions and rims that aren't interchangeable with my other cars—bummer!



Primo Tekin electronics—suitable for a world champion!

THE COMPETITION		CORALLY SP12GII	ASSOCIATED* 12LW	TRINITY* Revolver 12P
	Wheelbase (in.)	7.8	7.34	7.69
	Width (in.)	6.5 (F), 6.6 (R)	6.80	6.5
	Weight	1 lb., 13 oz. (4-cell)	2 lb., 0.34 oz. (6-cell)	1 lb., 6.4 oz. (4-cell)
	Diff type	Ball	Ball	Ball
	Chassis	Fiber-reinforced graphite	Graphite	Graphite
	List price	\$330	\$245	\$250
	Available at*	n/a	\$114.99	\$135.99
	Issue reviewed	9/95	2/92	2/94
*Prices will vary with location.				



These innovative Corally battery holders do a great job and eliminate the need for battery tape. Note the tweak adjuster mounted above the T-bar.

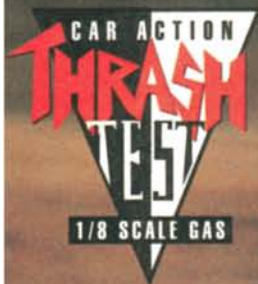


The innovative rear suspension uses an open motor pod that floats on captured rocker balls. The bladder contains thick, silicone syrup that damps the pod action.

FINAL THOUGHTS

I really like the Corally SP12GII; thanks to this car, I'm looking forward to the start of this year's 1/12-scale season. I'd pretty much given up on 1/12-scale racing because of my inglorious experience with the last car I owned, but the Corally has made me a believer again. If you've seen a pack of these tiny cars (powered by modified motors) zipping around a carpet roadcourse, then you know what close competition and racing strategy are all about. Care to join me?

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.



Tamiya **TGX-Mk.1TS**

by MIKE PAGANELLI

OVER THE YEARS, I've built many different styles of Tamiya cars: on-road, off-road; you name it, I've built it. One of my favorite styles is the on-road 4WD sedan. I have a $\frac{1}{10}$ -scale Mercedes ProMarkt and a BMW M3, and I love racing and just bashing around with friends in a parking lot. We even race with HPI* tires on a local off-road track. Dirt oval with these cars is a blast! The only thing I wanted to do was make my $\frac{1}{10}$ -scale cars gas-powered so that they would run faster and longer. I was just about to try to jam an engine into one when I saw Tamiya's* new ad in *Car Action*. That's when I found out about the TGX Mk.1!

FEATURES

The TGX looks a lot like a Tamiya $\frac{1}{10}$ -scale 4WD electric sedan, but it's bigger. It's $\frac{1}{8}$ scale to be exact, and despite

It's a **GAS!**



PHOTO BY JOHN HUBER

its larger size, it has all the details that I loved on the 1/10 sedans, including shaft drive and full-time 4WD and 4W independent suspension. The TGX has a beefy 2.5mm-thick chassis, and a hollow aluminum tube spans between the two gearboxes and makes the chassis super stiff. Bronze bushings are used for the steering bellcrank system, so the steering is very smooth. The bushings can be upgraded to bearings if you want, but for me, they're smooth enough as is.

Gear diffs are used in the front and rear gearboxes, and they're sure to hold up well under the power of the .15 engine. Like those on Tamiya's electric sedans, the gearboxes are designed to allow easy access to the diffs. Just remove a few screws, and the front or rear diff will slide right out.

The engine that comes with the TGX is a beauty. I've always liked OPS engines, and this one looks like a real performer. It's similar in size and dimensions to a CZ engine, but it has the larger displacement of a .15. A beefy pull-start system is included—a handy feature for beginners. The oversize red heat sink head does a good cooling job.

The TGX comes with Alfa-style rims and radial-pattern tires, but no body. The body was not included so that you can choose from three different styles (see "Factory Options"). Rims for the Mercedes and the Opel bodies are available separately, or you can just use the kit rims.

The servo-savers in this kit are unique. Unlike most stock

SPECIFICATIONS

SCALE.....1/8
LIST PRICE.....\$599

DIMENSIONS

Length (overall).....21 in.
Wheelbase.....11.75 in.
Width (F).....9 in.
Width (R).....8.75 in.

WEIGHT (gross, RTR).....5 lb., 9 oz.

CHASSIS

Type.....Plate
Material.....2.5mm-thick duralumin

DRIVE TRAIN

Type.....Gear
Transmission.....Bevel gear
Differential(s).....Gear
Slipper clutch.....None
Bearings/bushings.....Both

SUSPENSION (F/R)

Type.....Upper/lower A-arm
Damping.....Oil-filled coil-overs

WHEELS (F/R)

Type.....1-piece plastic
Dimensions (DxW).....2.25x1.25 in.

TIRES (F/R).....Semi-pneumatic
radial pattern

POWERPLANT

Engine, pipe, carb.....OPS .15
w/stock muffler and carb

OPTIONS TESTED

KO EX-1 radio system with Futaba S5101 for throttle and S9101 for steering servo; Dynamite 5-cell receiver pack; MIP onboard temperature gauge.



Building and Setup tips

Nothing I can say could make it any easier to build a Tamiya kit. But I can pass along a couple of hints to make the construction go more smoothly and to make the car run better in the end.

Because the TGX uses gear diffs for the front and rear, I added some silicone lube to thicken the diff action. This prevents the inside wheel from spooling up during a fast turn. I filled them right up for a stiff diff action.

On my electric sedans, I replaced the plastic, center drive-shaft retainers with a short section of fuel tubing. Don't try this on the TGX! I did, but it was soon torn to shreds and the center shaft went flying. After that, I replaced the stock plastic drive-shaft retainers but added a short section of tubing in front of each retainer on the shaft to center and align it.

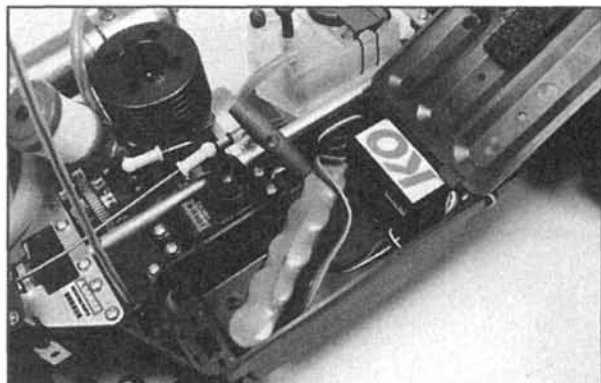
The engine is mounted on the chassis with four bolts. The chassis is slotted so that you can adjust the gear mesh. The instructions don't say that you should use washers between the engine-mount bolts and the chassis, but I think it's a good idea. Luckily, the kit comes with so many spare washers that you don't have to look elsewhere.

Be sure to open up a section of the windshield so that cool air can get to the engine. I recommend the MIP temperature gauge because it makes it easy to tune the car, even with the body on.

TGX-MK.1TS

servo savers that use a plastic ring to flex, the Tamiya servo savers for both steering and throttle use metal rings. One is used on the throttle for light action, and three are used on the steering for stiffer action.

The sealed radio compartment is a nice feature. There's so much room that the receiver and battery pack easily fit inside and are well-protected from the elements. The steering and throttle servos are attached to the outside of the case. To clean the chassis, remove the entire radio system by simply removing five screws and popping off the steering and throttle connections. Believe me, this is very helpful when you clean the car!



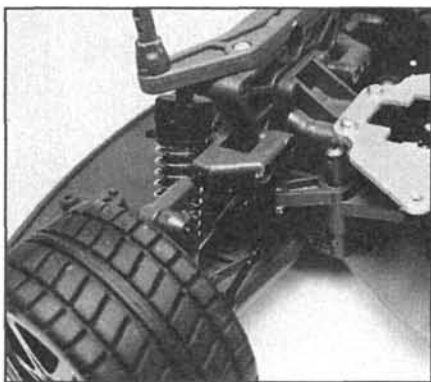
The radio compartment has plenty of room for gear. The hinged cover is held in place by one body clip.

TEST GEAR

My radio of choice is the KO* EX-1, which I've had for a couple of years. I used the stock FM receiver and Futaba* servos (no. S5101 for the throttle; no. S9101 for the steering). They have the same case dimensions, but they're geared differently so their performances differ slightly. I use a Dynamite* 5-cell receiver pack and still have enough space for a single sub-C that I may install later as an onboard glow battery.

PERFORMANCE

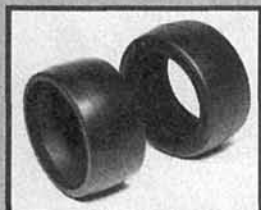
I got the TGX started pretty easily, but I had a hard time tuning the engine the first time out. I ran the car very rich for the first four or five tanks, but when I tried to open it up, the engine stalled. I leaned the engine out a bit and continued my test. For some reason, after the car had run down a long straightaway, the setting would suddenly go lean, and then the engine would bog terribly coming out of a turn. I noticed that the fuel in the tank was being shaken so



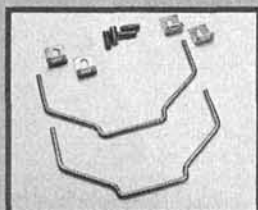
Front suspension is beefy yet simple.

Factory Options

- Three bodies: Alfa Romeo 155 V6 TI, Opel Calibra V6 and Tabac-Original Sonax AMG Mercedes C-class DTM.
- Three wheel styles to match bodies
- 2-speed tranny
- Stainless-steel hinge pins
- Universal drive shafts
- Ball-bearing kit
- Fuel tank indicator light
- One-way center diff
- Turnbuckles
- High-performance brake disk
- Anti-roll bars
- Aluminum shocks
- Aluminum wheel hubs
- Slick tires with inserts
- EGR starting system



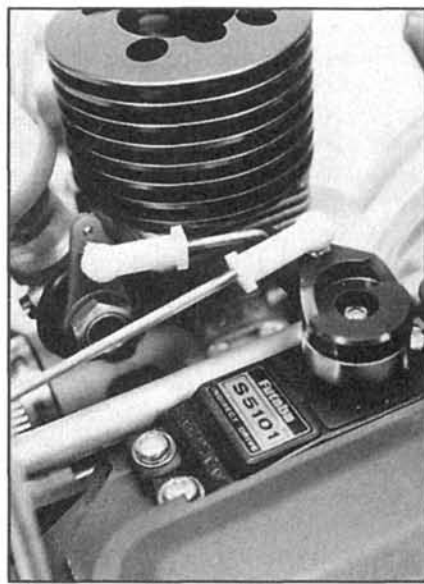
Slicks with molded inserts



Anti-roll bars



Two-speed tranny



Throttle and brake linkages are very simple to set up. Notice the metal servo-saver spring.

Things You'll Need:

Receiver pack

Good-quality radio system with mid- to high-range servos

Glow-plug igniter

Fuel

and one

BIG
parking lot!



violently that it foamed with air bubbles. I solved the problem by putting small pieces of fuel tubing under the tank mounts to help absorb the vibration. I also drilled out the pressure and fuel fittings on the tank because they were so tiny, and this cured a lot of the tuning problems. I was then able to get the engine to run consistently. I mounted an MIP* temperature gauge on the rear body mount so that I could see it through the rear window.

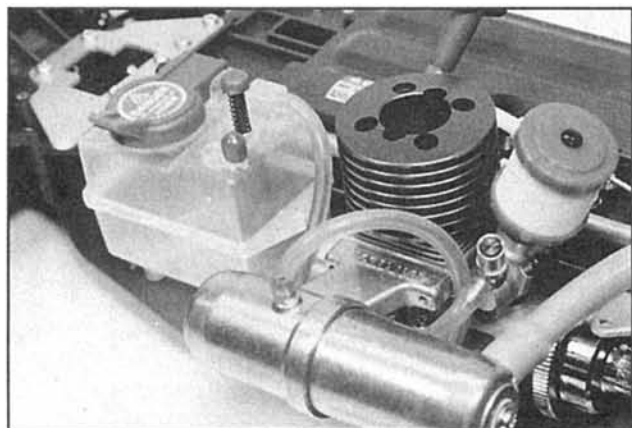
As for handling, the TGX drives just like a 1/10-scale electric sedan, only faster. I was able to drift the car through the turns at full speed, and I powered down the straights with ease. Because there is no center diff, full power is delivered to all four wheels for wheel-spinning takeoffs and screeching stops.

The first time out, I ran the car with the

provided rubber exhaust tubing. It did a great job of routing the grimy oil and exhaust to the rear of the chassis, but it seemed to cut power. I removed the tubing and opened the muffler by removing the center screw. Inside, I found a large baffle and a couple of paper gaskets; these, too, were restricting exhaust flow so out they went. I added some silicone to the muffler seams and screwed it back together with the outlet aimed toward the left side of the chassis. In this position, all I needed was a small hole in the side of the body to vent the exhaust. A little louder—a lot faster!

After a week or so, I got some hop-ups for the TGX. Tamiya makes a great set of soft rubber slick tires with the coolest molded-foam inserts that I've ever seen. These slicks improved traction on all but the dustiest surfaces. I also added anti-roll bars and the ultimate in go-fast goodies—the 2-speed tranny!

The 2-speed is a very simple conversion that consists of a new clutch bell and gears and a set of clutch shoes. With the tranny installed, the gear ratio will switch when the drive train reaches a certain speed. To adjust the shift point to suit your track conditions, loosen or tighten a small screw in the center gears.



The included OPS/Tamiya engine can really put out some power!

likes

- It's fast—right out of the box.
- Available 2-speed tranny.
- Sealed radio compartment.
- Metal bushings in most places, including steering bellcranks.
- I've seen it advertised for less than \$400, including the body!

dislikes

- Front bearing on engine leaks a lot of fuel.
- Long exhaust tubing robs the engine of some power.
- Engine bolts should have beveled washers.

With the 2-speed on the TGX, I headed out to the track. I drove the car until I thought the engine would blow, but the gears still wouldn't shift. I loosened the screw and tried again—many times. I finally got it right and oh, boy, did it move! The sound of the engine revving up and then dropping as it shifted was music to my ears. I thought that the car was fast before, but this was ridiculous! I estimate its speed to be 45 to 50mph! It's a good thing I added the slicks and the anti-roll bars, because at full speed, I needed them in the turns.

FINAL THOUGHTS

So, you want a cool, fast, big, loud, sleek car that looks just like a real racecar? Look no further. The TGX packs all the fun of an electric sedan and the thrills of an 1/8-scale gas car into one package. It's priced much lower than an 1/8-scale racecar, so even if you're new to nitro, you can give it a shot and upgrade to an even faster 2-speed rocket when you're ready (in about a week!).

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.



Start

YOU'RE A BIG FAN of the R/C hobby, you read *R/C Car Action* regularly, and you love bashing around in the backyard, but you've never ever been to a race.

You think you want to give racing a shot, but you aren't exactly sure how to go about it.

Do you even know *what* you want to race? There are so many different types of racing that it can be overwhelming to a newcomer.

When you've finished reading this article, we hope you'll be heading down the right track (no pun intended) toward giving your racing career a jump-start. We'll look at the current, most popular forms of on- and off-road R/C racing throughout the country and worldwide, and we'll examine the most up-to-date racing vehicles in each category.

Racing

COMPETITION GUIDE

1/12 SCALE

This category is for those who crave precision driving. Powered by four cells when raced indoors on carpet and six cells when raced outdoors, the cars, which resemble scaled-down versions of 1/10-scale pan cars, are quick and nimble. Both stock and modified-motor races generally last 8 minutes. Most 1/12-scale racing takes

place indoors on carpet tracks, so it tends to be a very seasonal category; it starts in the fall and ends right around the start of spring. It isn't relegated to being an indoor-only racing class though; racers compete in 4- and 6-cell oval races, too.

Year's biggest races

ROAR 4-cell Nationals, IFMAR Worlds and the

NORCAR Indoor Champs, which is held in Cleveland, OH, every Thanksgiving.

1/12-SCALE VEHICLES

- Associated* Club 12; RC12LW.
- Corally* SP12GII.
- CRC* Carpet Knife.
- Trinity* Revolver 12p; Revolver 12ss (superspeedway version).

1/10 SCALE

OFF-ROAD

It's no wonder that this is the most popular form of R/C racing! Nailing crazy jumps, kicking up dirt, roosting your competition; that's the name of the game in off-road 1/10-scale racing. Three types of electric vehicles are raced in off-road: 2WD and 4WD buggies, and trucks.

2WD BUGGY

When it comes to 1/10-scale off-road racing, buggies get the most attention. They're more nimble than trucks, but they aren't as firmly glued to the track as 4WD buggies. Races last for 4 minutes, and you can choose to run in stock (stock motors) or modified (modified motors). When the big

events come around though, the buggies are the ones that grab the spotlight.

Year's biggest races

ROAR Modified and Stock Nationals, Florida Winterchamps, Reedy Race of Champions, NORRCA Off-Road Nationals. Every two years—

IFMAR Off-Road World Championships.

1/10-SCALE 2WD BUGGIES

- Associated RC10 Worlds car.
- Kyosho* Pro-X.
- Team Losi* Double-X.
- Schumacher* Cougar 2000 '95 Spec.
- Traxxas* TCP.

RADIO CONTROL CAR ACTION'S COMPETITION GUIDE

1/10 SCALE OFF-ROAD

4WD BUGGY

4WD buggies are the fastest electric cars out on the tracks, but the class is the smallest in the off-road electric division. There are two reasons: the lack of a domestically manufactured kit (which means costs are higher and parts availability isn't as good) and the complexity of the 4WD drive systems.

Today's 4WD buggies, however, are much faster and easier to build, set up and maintain than those of the past. As with the 2WD buggies, races last 4 minutes, and you have the choice of running in stock and modified classes.

Year's biggest races

ROAR Stock and Modified Nationals, Florida Winter-champs, Reedy Race of Champions and IFMAR World Championships.

1/10-SCALE 4WD BUGGIES

- Kyosho Lazer ZX-R.
- Schumacher Cat 2000 '95 Spec.
- Tenth Technology* Predator.
- Yokomo* YZ-10.

TRUCK

Stadium trucks are quickly becoming the "big guns" of all the major manufacturers. They're also fast becoming the "élites" at major events, and truck racing might possibly get even bigger than buggy racing. On rougher tracks, trucks are generally more stable than buggies, and they allow the driver to make minor mistakes without losing too much time. Once again, there are two classes—stock and modified.

Year's biggest races

ROAR Modified and Stock Truck Nationals,

NORRCA Truck Nationals and Truck Worlds and Florida Winterchamps.

1/10-SCALE TRUCKS

- Associated RC10T2.
- Kyosho Pro-XRT.
- Team Losi Double-Xt.
- Schumacher Storm 2000.
- Traxxas SRT.

MONSTER TRUCK

On TV, you've seen them crushing everything in their path; they're brutal machines with monstrous tires. Yes, folks, we're talking about monster trucks. These scaled-down versions aren't very different from their full-size counterparts: they, too, crush everything in their path. But these trucks aren't just made for crushing; people race them in pulling and obstacle-course-type races as well. They race with

their trucks in box-stock condition, but most of the time, they build up wild Bennett Equipment* and ESP* Clod Busters and Bullheads.

For racing information

Contact the good folks at the NRCTPA.

MONSTER TRUCKS

- Bennett Equipment Clod-A-Leaver II (you'll need miscellaneous Tamiya Clod or Bullhead parts to complete this).
- ESP Clod-A-Leaver III (you'll need miscellaneous Tamiya Clod or Bullhead parts to complete this).
- Kyosho—Tracker; USA-1; Nitro Thrasher; Nitro Crusher.
- MRC* MT-10M.
- Tamiya* Mountaineer; Clod Buster; Bullhead.
- Traxxas Stampede.

DIRT OVAL

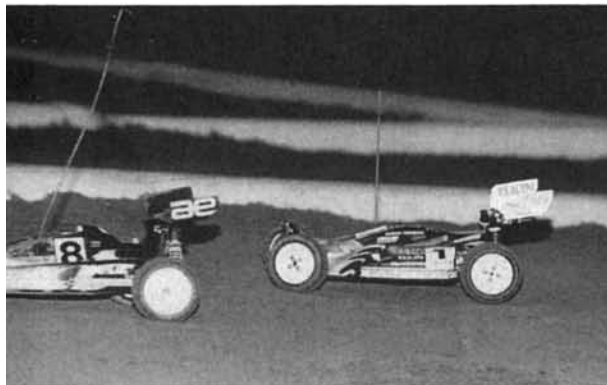
Fashioned after full-size Sprint cars, Outlaw cars and Wedge cars, these 1/10-scale dirt slingers go fast and turn left only. Just think of them as superspeedway cars on dirt. Dirt oval has a large following on the East Coast and in the South, where enthusiasts run stock and modified classes, and races last for 4 minutes.

Year's biggest races

ROAR and NORRCA Dirt Oval Nationals.

DIRT OVAL VEHICLES

- C&M* Cobra Nemesis; Nemesis (Sport version).
- Custom Works* Enforcer; Intimidator; Dominator.
- Trinity Reflex 10.



Racing Organizations

NORRCA (National Organization for Racing Radio-Controlled Autos)
1651 W. Foothill Blvd., Ste. 292
Upland, CA 91786
(909) 944-5381
fax (909) 944-2996

NRCTPA (National Radio-Control Truck-Pulling Association)
2321 Greenwood Ct.
Champaign, IL 61821
(217) 359-7628

QSAC (Quarter-Scale Auto Club)
24625 West 71st St.
Shawnee Mission, KS 66227
fax (815) 637-1239

ROAR (Radio-Operated Auto Racing)
30872 Coast Hwy., Ste. 111
Laguna Beach, CA 92677
(714) 494-0515

So what do you have, and where do you race 'em?

OK; now that you have that shiny new parking-lot racer or spec car, it's time to get out there and get racing! But where do you race it, and can you race it in a certain series or event? Well, here are the basic car rules and requirements.

Bolink Legends Series

(404) 963-0252

Only Legends cars and equipment are allowed to run. The four race classes are based on driver ability, not equipment:

- Charger: for entry-level drivers.
- Semi-Pro: for drivers with mid-level skills.
- Pro: for experienced drivers.
- Masters: for drivers over the age of 45.

Hobby Shack

(714) 964-8846

Hobby Shack offers a diversified racing program that has something for everyone. There are 11 classes, but racers are limited to entering a maximum of two classes in each event. Take a look at the list to see where your car is allowed.

- F1 Rookie—Tamiya F1 cars only.
- F1 Stock—Tamiya F1 cars only.
- F1 Expert—any brand of F1 car.
- Sedan Touring Car Rookie—any Tamiya FWD or 4WD sedan.
- Sedan Touring Car Stock—any Tamiya FWD or 4WD sedan.
- Sedan Touring Car Expert—any brand of 1/10-scale FWD or 4WD sedan.
- Gear Box Rookie—any brand of 1/10-scale, off-road buggy or truck.
- Gear Box Pro Stock—any brand of 1/10-scale, off-road buggy or truck.
- Bolink Legends—only Legends equipment allowed (cars, bodies, tires, motors).
- 1/10-Scale Direct-Drive Stock—any brand of 1/10-scale direct-drive car.
- 1/10-Scale Expert Direct-Drive—any brand of 1/10-scale direct-drive car.

Hobby Town USA

(402) 434-5050

The rules for these races are determined by individual stores, which consider the needs of and/or the equipment being used by the racers in the area. Most of the shops follow ROAR, Tamiya, or Kyosho rules. Call the shop in your area for details.

Kyosho R/C Sport Racing

(800) 682-8948, extension 085F

This series only has Supersport and Open classes right now, but Kyosho is working hard to expand this to include Gearbox, Pan Car, Stock and Nastruck classes. To race in the Supersport class, you have to have a Kyosho F1 or Indycar. The Open class allows any brand of F1 or Indycar.

Tamiya R/C Championship Series

(800) TAMIYA-A

There are four classes in which you can run your favorite Tamiya car or desert racing truck. Every class runs both Stock and Modified races (depending on the number of entries). Requirements for each class:

- F1 and Indy—any Tamiya F1 or Indy chassis.
- Sedan—any Tamiya FWD, TA01, TA02, or TA02W 4WD chassis.
- GTP—any Tamiya GTO/GTP chassis.
- 4WD Stadium Truck—only the Tamiya Toyota Prerunner, Chevy S-10, or Tamiya stadium trucks.

Trinity Street Spec Series

(908) 862-1705

Only Trinity and TRC Street Spec cars and trucks are allowed to run at this time. The series offers both Stock and Nastruck classes.

1/10

SCALE

PARKING LOT

Parking-lot racing (PLR) is most popular in Southern California, but it's gaining ground across the country. It's one of the least expensive categories, and one of the highlights is that it isn't an all-day affair. Racers get together, practice, qualify and race all in one morning or afternoon session. With this type of racing, people are getting back to the basics: find a smooth parking lot, set up some cones or lay down a fire hose and go at it! There are four specific types of parking-lot racers: F1 and Indy, GTP and IMSA, sedans and spec-class racers.

F1 AND INDY

F1 and Indy cars are among the most popular vehicles in the parking-lot division. They perform nearly as well as many pan-type, full-bore racers, but they offer enough scale realism to satisfy the most serious of full-scale racing fans. Although predominantly run using foam tires, semi-pneumatic, treaded-type tires are now available to allow these cars to be run on unswept asphalt.

Year's biggest races

Tamiya R/C Championship races, NORRCA Street Fighter Series and all the Hobby Shack events.

F1 AND INDY PLR VEHICLES

- Corally F1 racing car.
- HPI* Super F1; Super F1 (fiber-glass sport version).
- Kyosho Impress; SR-5 Sport Racer; Target/Scotch Indycar.
- Tamiya F101, F102 and F103 (available in a wide variety of body styles).

GTP/IMSA GTS
Fans of full-size IMSA GTS and GTP racing

can rejoice. Faithfully reproducing the sleek lines of the cars that compete in such famous races as Le Mans and the 24 Hours of Daytona, these cars feature fully tunable, racing-type chassis and realistic wheels and tires.

Year's biggest races

Held at the Tamiya R/C Championship Series, and you can race your car at Hobby Shack and Kyosho R/C Sport Racing events, too.

GTP/IMSA GTS PLR VEHICLES

- Tamiya Nissan 300ZX IMSA GTS; Nissan R91CP; Mazda 787B.

SEDANS

People like sedans because they're fashioned after the cars that you see driving on local streets every day. When you drive a sedan, you encounter the same situations as you would while racing a full-size car—chassis roll, power drifts and understeer.

Year's biggest races

Tamiya R/C Championship series, NORRCA Street Fighter Series and all Hobby Shack events.

PLR SEDANS

- Kyosho Spider; Alpha Lazer; Outrage.
- Tamiya TA01, TA02 4WD, TA02 FWD and TA02W (available with a variety of body kits).
- Tenth Technology Predator touring sedan.
- Schumacher Wildcat; Club 10; BossCat; Cat 2000 Touring.
- Yokomo YR-4.

SPEC-CLASS RACING

These cars are designed to compete in specific spec-type racing series in which strict rules govern the modifications allowed. Spec-class racing is intended to provide an equal forum for all, with low cost as the prime ingredient. Be aware, however, that not all spec-type cars are eligible to compete in the various national programs. (See the sidebar, "Parking-Lot Pounders," for more specific information on the rules for each spec program.)

SPEC CLASS VEHICLES

- Bolink* Legend.
- Trinity's* Spec-10.
- TRC's SPEC 10.

RADIO CONTROL CAR ACTION'S COMPETITION GUIDE



1/10 SCALE NITRO POWER

Nitro-powered vehicles go fast, run long and sound cool. Powered by .12 glow engines (.15s can be used, but rarely are), these 1/10-scale screamers require more maintenance than electric vehicles, and initially, they're a little harder to get running.

2WD BUGGY

As it stands right now, there's no major racing activity in the 1/10-scale 2WD nitro buggy division. They're basically similar to their electric-powered siblings.

For racing information

Check with your local tracks, NORRCA and ROAR to see whether anyone has plans to start a 2WD gas-buggy racing program in your area.

2WD BUGGY VEHICLES

- Kyosho Outrage.
- Traxxas Nitro Buggy.

4WD BUGGY

As of this writing, no one we know races 1/10-scale 4WD buggies either. The cars are wicked-fast and handle like their electric counterparts. The latest we've heard is that the major gas racing promoters are trying to introduce 1/10-scale 4WD buggies into all the big gas racing programs.

For racing information

To find out about racing activity in your area, try contacting your local tracks as well as NORRCA and ROAR.

4WD BUGGY VEHICLES

- Kyosho Inferno 10.
- OFNA Racing* Pirate 10.

TRUCK

Without a doubt, this is the most popular class in 1/10-scale nitro. Even though the Kyosho Outlaw Rampage was the first

nitro-powered truck to hit the market back in '90/'91, we can credit the Traxxas Nitro Hawk with being the vehicle that actually pushed the nitro truck class up to its present level. Soon after its introduction, companies such as Team Associated, Kyosho and Schumacher began to produce full-blown nitro racing trucks, and the category began to gain momentum. Because the nitro trucks handle like the electric versions, racers are easily pulled into the nitro truck category.

The trucks also have more power, and they easily accept a lot of the parts that are available for electric trucks.

For racing information

Check with your local tracks as well as with ROAR and NORRCA.

TRUCKS

- Associated RC10GT.
- Kyosho Outlaw Rampage Pro.
- Traxxas Nitro Hawk.
- Schumacher Nitro Storm 2000.
- Flying Point* Pizazz TK-1.

1/10 SCALE ON-ROAD

ON-ROAD ELECTRIC

Similar to 1/12-scale racing, it requires a deft hand to navigate around an on-road course, and your reaction time must be very quick. On-road racing started out as basic parking-lot racing, but it evolved into an entirely new form of competitive racing.

Year's biggest races

ROAR On-Road Nationals, NORRCA On-Road Nationals, IFMAR On-Road Worlds.

ON-ROAD VEHICLES

- Associated RC10LS.
- Bolink XL Road Racer.
- Corally SP10V.
- HPI Roadstar.
- PTI/Hyperdrive* Hyperdrive.
- Trinity EV10.
- Yokomo YRX-10.

DRAGSTERS

One-tenth-scale dragsters take after their full-size counterparts; they're wicked fast. Powered by wild modified motors (sometimes specialized cobalt magnet

motors), they're raced on scaled-down quarter-mile drag strips. Some use 3/4 sub-C 1000 Sanyo cells, while others choose 1200 or 1700 SCRs to power their rides.

Year's biggest race

IEDA Drag Worlds.

DRAGSTERS

- Fine Design* Ultraliner; Top Fuel Dragster; Patriot Drag Truck; Funny Car; Pro-Stock; Pro-Mod.
- Hyperdrive Funny Car; Pro-Stock.
- Bolink Pro-Stock.

- Lockmann* Precision Dragster; Precision Funny Car; Precision Pro-Stock.
- Lightz Products* Dragster; Funny Car; Pro-Stock.
- Trinity Pro-Stock; Funny Car.

gas racers come with a 2-speed tranny that allows blistering speeds.

Year's biggest races

ROAR On-Road Gas Nationals and Texas Biggie.

ON-ROAD NITRO VEHICLES

- BMT* 931K (2WD); 931K4 (4WD).
- OFNA Colt 10 2WD and 4WD.
- Mugen* K2-X 4WD.
- Picco* RS600 4WD.
- Serpent* Impact-2 Pro 2WD and 4WD.

ON-ROAD NITRO

One-tenth-scale, nitro, on-road cars are basically scaled-down versions of their big 1/8-scale brothers. They feature the same belt-drive system, they come in 2WD and 4WD configurations, and they're powered by ultra-fast .15 engines. Most on-road

1/10 SCALE

SUPER-SPEEDWAY

Full-size NASCAR racing is America's racing version of apple pie! Without a doubt, it's one of the most popular forms of racing in this country, so it's no wonder that R/C super-speedway racing is popular. The cars started out as modified pan cars, but as companies increasingly put more R&D time into them than into their on-road pan cars, the superspeedway vehicles evolved. For maximum handling, the batteries (and sometimes the motor) are mounted on the left side. When running on outdoor asphalt or concrete ovals, racers use rubber-capped tires; indoors, they switch to foam tires. Races last 4 minutes, and at some events, such as the annual Whippoorwill Oval Masters, there are Enduro races of 250, sometimes 500 laps—with the help of pit crews and quick-change battery packs.

Year's biggest races

U.S. Oval Masters at Lake Whippoorwill, FL, ROAR Oval Nationals and NORRCA Oval Nationals.

SUPER-SPEEDWAY VEHICLES

- Associated RC10Lss.
- Trinity EV10ss.
- Bolink LTO Pro.
- C&M Cobra.
- PTI/Hyperdrive SSE.

1/8 SCALE GAS ON-ROAD

These nitro-powered vehicles are powered by .21 engines and have elaborate drive trains. They are, without a doubt, the fastest, most powerful racing machines, but they're also very complex and require more maintenance than most other R/C vehicles.

4WD CARS

have often been referred to as the F1 cars of our hobby, meaning that they are considered to be the most high-tech machinery that is currently raced. The cars are powered by lightning-fast .21

engines and feature belt driven all-wheel drive systems.

4WD ON-ROAD VEHICLES

- BMT 941 Active 95R.
- OFNA Colt 4WD.
- Picco RS600.
- Serpent Excel 4WD.

2WD CARS

are almost identical to their 4WD counterparts. They share the same powerplants (.21), and the same overall geometry. Handling is not as precise, though.

Year's biggest races
Texas Biggie, ROAR

On-Road Nats, IFMAR On-Road Worlds

2WD ON-ROAD VEHICLES

- BMT 934 Vitesse; 941 Active.
- OFNA Colt.
- Serpent Excel 2WD.

1/8 SCALE

GAS OFF-ROAD

This scale is not for the faint-hearted.

4WD BUGGY

In 1/8 scale, 4WD off-road buggies are brutal. Try to imagine a chain saw on wheels, and you're pretty close. Like 1/8-scale on-road cars, off-road buggies are powered by .21 engines, but unlike on-road cars, all off-road buggies are 4WD.

Year's biggest races

Held in Detroit, MI, and Hemet, CA, and one is held in the Southeast (previously at PC Hobbies in North Carolina; this year's location hasn't yet been chosen). For more information, contact ROAR.

4WD OFF-ROAD BUGGIES

- Flying Point Jet Probe.
- Kyosho Turbo Inferno.
- Mugen Athlete.
- OFNA Pirate RS; HODR; Ultra GT.

4WD TRUCK

Basically, 4WD off-road nitro-powered trucks are buggies equipped with truck tires and truck bodies. They're usually raced at the big events where 1/8-scale buggies are being raced.

For racing information
Check with ROAR.

4WD OFF-ROAD TRUCKS

- Kyosho Inferno ST.
- Mugen Toyota.
- OFNA HODR Blazer SST.



1/4 SCALE

These are the largest R/C vehicles currently produced and raced. Though they don't have a widespread following in the U.S., no one disputes that they're awesome machines. The vehicles (mainly GTP, NASCAR and dirt-oval-type sprint vehicles) feature welded-tube chassis and are most often equipped with 33cc engines (Zenoah G2-Ds are among the most popular). The fiberglass shells they're topped off with look very realistic.

For racing information

On racing activity and available cars, check with the people at Quarter-Scale Auto Club (QSAC).



*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Off-Road Suspension SECRETS REVEALED!

by JACK JOHNSON

THE SHOCKING TRUTH!!!

Who is this man? Whoever he is, he emerged today from a building long suspected of testing suspension for off-road R/C vehicles.

After a long chase, we were able to squeeze the words "No comment" out of him as he tried desperately to escape his captors. No more.

How you mount the rear shocks is just as important as the type of oil and spring that you use. The more the shocks are inclined, the greater the tendency of the chassis to "roll" during cornering.

IN THE PAST, I've written about shock and spring damping, and I've even covered the valving of shocks. The one thing I haven't discussed is shock mounting locations and their effect on your car's handling. Well, I guess now is as good a time as any to dive in and take a look.

Some of the suspension adjustments that I'll cover in this article might not be possible on all cars and trucks. But even if you can't make a particular adjustment to your vehicle, the suggestions will give you a better understanding of how your suspension functions as a whole.

THE BASICS

Shock mounting location—the location of the top and bottom of the shock—affects your vehicle in several ways.

When you mount the bottom of the

shock farther out on the suspension arm, a couple of things will happen.

- First, you'll notice less downward travel. In some cases, you can adjust this by moving the top of the shock to a lower hole on the shock tower (if the tower is so equipped), or by removing the travel limiters from the inside of the shock (if you use them).
- Second, you'll notice an increase in piston speed. In most cases, you'll have to adjust damping by switching to a lighter weight shock oil.

If you were to move the bottom of the shock further inward on the lower suspension arm, you would reverse the above conditions and would need to compensate by using a thicker shock oil.

IN THE REAR

Moving the shocks outward on the rear arms can give your car a performance

PHOTOS BY JACK JOHNSON AND WALTER SIDAS

advantage, especially over large jumps. This is because the increased piston speed gives the shock more "pack," which helps to cushion the landings off big jumps because the shock acts like a hydraulic "bump-stop." Shock damping can be adjusted so that you can take advantage of your vehicle's improved jumping capability, and also so that your vehicle will have "static" damping that's light enough to get through the small bumps. For this reason, I believe that in most situations you'll want to use the hole that is the farthest out on the arm. But keep in mind that the farther out on the arm you mount the shock, the lighter the spring you'll need.

Now let's talk about the mounting location for the top of the rear shocks:

- A good, neutral shock mounting location is where the shock is at a 90-degree angle to the arm when the suspension has been fully compressed. This is a good position to start with.
- A rule of thumb to remember: the farther the shocks are laid down, the more the chassis will roll; because of this steering will increase at high speeds, and the vehicle will usually go through bumps and rough sections better. The downside?—a slight loss of forward traction.
- As you change the shock angle, you should also adjust the springs. If you lay down the shock more, you should increase the spring rate (stiffness) slightly.
- If you mount the shock in a more upright position, you should use a softer spring.
- As you lay the shocks down, you should

raise the ride height slightly to help the chassis stay flat during cornering.

IN THE FRONT

The mounting location of the bottom of the front shock has a slightly different effect on handling than that of the rear shock. For the most part, you'll find that most popular off-road cars have the shock mounted almost exactly in the center of the suspension arm. This center location offers the best compromise between steering and jumping. You'll usually find that moving the bottom of the shock farther out on the arm will make steering react quicker, but not as quickly as if the shock was mounted further in. This means that the car or truck will start to turn in harder, but as you drive into the corners, you won't have as much steering.

On the other hand, mounting the bottom of the shock farther out on the arm will also make steering response smoother at high speeds, but as you slow down, low-speed steering will increase.

The position of the front shock on the arm can change the way the vehicle jumps in the same way that the rear shock affects this. The same applies to the front shocks; as the shock is moved out on the arm, a lighter spring is required and vice versa.

There are several things to consider when finding the mounting location for the top of the front shock:

- The same holds true for the front as for the rear: a good starting position is where the shock is at a 90-degree angle

Trick Tools



RPM tools for rebuilding Losi and Associated shocks.

Rebuilding the shocks on your car or truck can be a pain. First, there's the mess. Then, the tiny O-rings can be problematic; even bleeding the shocks can be tricky! Sometimes, just finding the right tools to do the job is tough. Fortunately, a couple of tools made by RPM* can make this process a little easier.

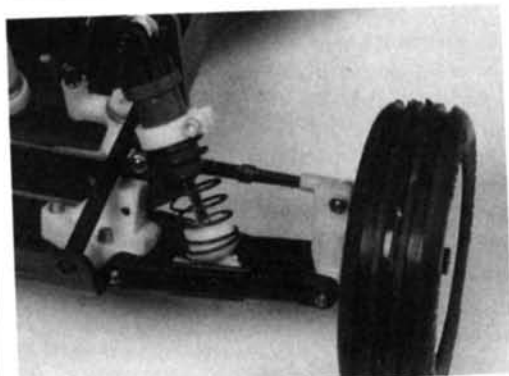
RPM has been part of the R/C industry for nearly 10 years. They started by making suspension arms for other manufacturers and eventually, they went out on their own and started to make accessories for all the popular cars on the market. Then, to make the R/C modeler's life a little easier, RPM started to make tools.

The cool shock wrenches that they produce really do make it easier to rebuild your shocks. They're available for both Losi* and Associated* shocks, and they eliminate the need for pliers, vise grips, or any other awkward tool that you've been using. These wrenches are molded to fit the shape of the shock perfectly. One wrench fits on each end of the shock like a glove, so all you need to do is twist the two ends to loosen or tighten the shock. I recently started to use these tools and can't imagine being without them. Now, if we can just find a way to do away with all that messy shock fluid!

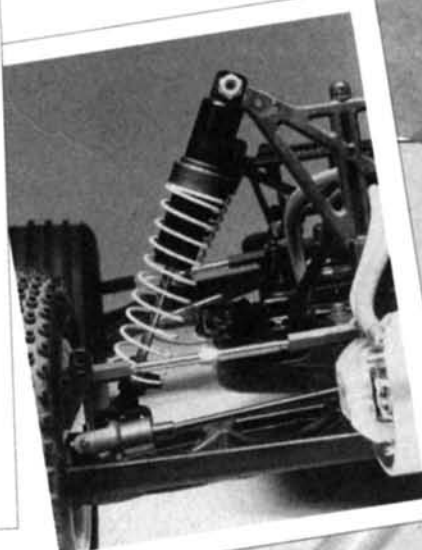


One tool is designed to grip the shock body, and the other grips the shock cap. Twisting the tools allow you to easily tighten or loosen the shock cap or the cartridge.

When the rear shocks are "stood up" in a more upright position, the chassis will stay flatter during cornering, but rear traction will be slightly reduced. This position will also increase steering response.

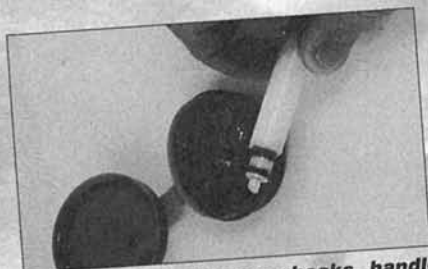


Mounting the front shock farther out on the arm will generally quicken steering response and yield more "turn-in" steering.



Rebuild Time

If you notice that oil is always leaking out of the bottom of your shocks, it's probably time to rebuild them. The most important thing to keep in mind when doing so is to handle the new O-rings carefully so that you don't tear them. If you tear one, the shocks will leak



When you rebuild your shocks, handle the O-ring seals carefully so that you don't tear them. Use a shock-seal lubricant such as RCPS's "Green Slime" to enhance the smoothness of the shocks, and reduce "stiction" and O-ring swelling.

from the very start and your rebuild will be worthless.

Start by emptying out the old shock fluid. Wipe any excess fluid off the inside of the shock bodies. If your shock uses cartridges, remove them from the shock shafts; otherwise, remove the old O-rings and spacers from the inside of the shock bodies. When you've removed the parts from the inside, clean the shock bodies thoroughly to remove any remaining oil.

Before you install the new O-rings, you may want to get some "Green Slime" grease from RCPS*. I find that this stuff really helps to make the shocks smoother and creates a better seal. Before you install the O-ring, cover it entirely with this grease. It's a good idea to put some grease on the inside of the spacers also. If your shock uses a cartridge, you can take the cap off the cartridge and grease the O-rings and spacers as just mentioned.

When you've reinstalled the shock shaft, wipe any excess grease off the outside of the



Before you insert the shock shaft into the shock and through the seals, lubricate the shaft threads with shock oil to avoid damaging the shock seals.

shock. Then fill up the shocks and bleed them according to the instructions for your particular car. When the shocks have been properly bled, you should be able to compress them all the way. If you can't all the way, you've filled them with too much oil. Bleed them a little more and try again. If you feel air bubbles in the shock as you move the shaft in and out, you need to add more oil. A properly built shock can really improve your car's handling. Take your time and get it right.

REVEALED!

THE (NO LONGER) SECRET LANGUAGE FOR SHOCK ABSORBERS!

COMPRESSION: the action of the shock shaft as it is pushed into the shock body.

DAMPING: the deadening or restraining of an action. Dampers (shocks) absorb energy from moving suspension parts and convert that energy into heat.

FRICITION: resistance of one object moving against another object.

PACK: a condition caused by excessively slow rebound damping, i.e., the shock is rebounding as the car hits the next obstacle.

PRELOAD: the amount of tension placed on the shock spring.

REBOUND: the action of the shock shaft as it is pulled from the shock body by the shock spring and the weight of the "sprung" suspension parts.

RIDE HEIGHT: how high the vehicle's chassis sits off the ground (in ready-to-run form).

SPRING RATE: the spring's stiffness, or rate of compression.

STATIC DAMPING: how the shock feels when you actuate it by hand; the effects of piston valving and pack aren't apparent in static damping.

STICTION: the initial amount of energy it takes to start moving an object; more energy is required to start moving an object than is required for it to remain in motion.

to the arm when the suspension has been fully compressed.

- By altering the mounting location of the top of the front shock, you can adjust the car's handling during cornering; the more the shocks are laid down, the more low-speed steering you'll have.

- The downside is that steering will react more slowly, and sometimes you'll experience a nasty "hook" in the middle of the corner. Again, as you lay down the shock, use a slightly stiffer spring and raise the ride height just a little.

- If the top of the shock is moved farther out, you'll notice that the initial steering will be more sensitive at high speeds, but as you slow down in the corner, the steering won't increase and you may experience a slight "push." Standing the shock up straight is good because it makes the vehicle exit corners a little straighter. This can come in handy if you're running on a slick surface and are having trouble coming onto a straightaway.

WHAT DOES IT ALL MEAN?

As usual, it's tough to give you a wealth of information in a short article. All of the things that I've men-

tioned should be enough to get you started with suspension adjustment. As always, the best way to know how these adjustments really work is to try them yourself. Take note of how each adjustment affects handling. After you've tried several adjustments, go back through your notes and try to pair a good rear-suspension setting with the best front-end setting. One setting that didn't work before might work when coupled with a different setting on the other end of the vehicle.

Remember that one of the things that makes racing R/C cars so much fun is being able to tune and adjust them just as you would full-size racecars. Many of the engineers I've spoken to over the years are jealous of R/C car racers because we can make adjustments to our cars so quickly and easily. Some of these engineers even use R/C cars to test theories that apply to full-size cars. Just remember to have fun! Don't get so serious about your testing that you become frustrated. That's the manufacturer's job!

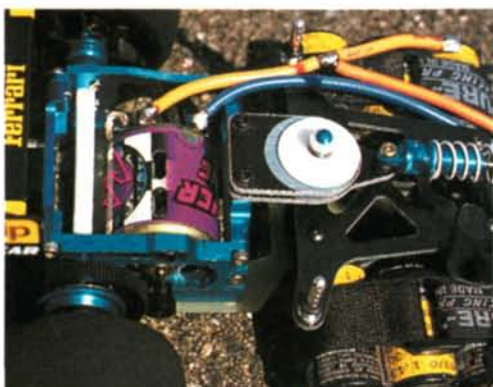
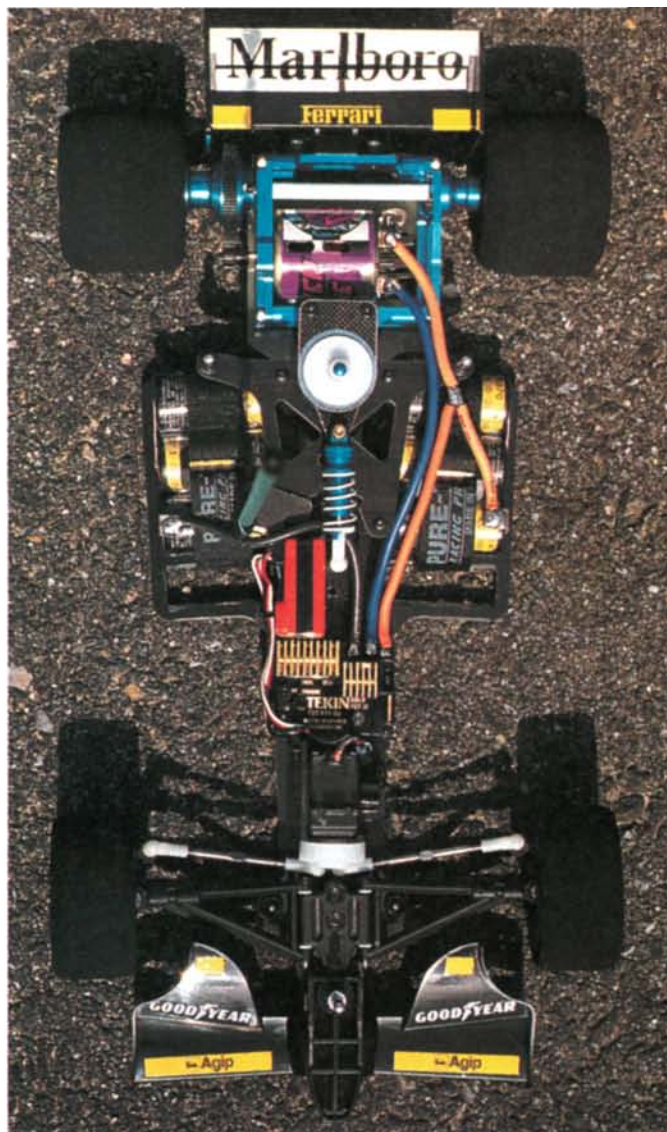
* Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■

Go fast goodies
for the
parking lot set

F1

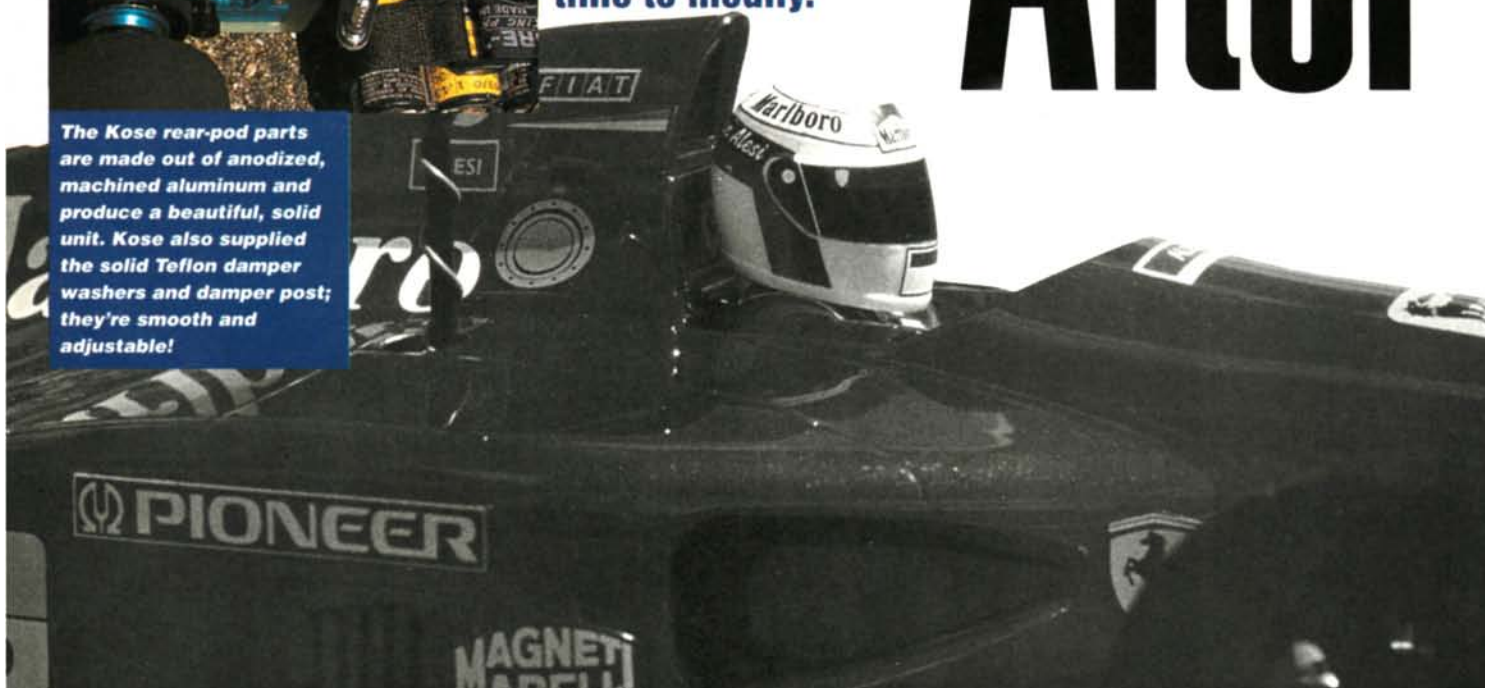
SO, YOU'VE taken the big dive—the **Formula 1** plunge: car kit, radio, batteries, charger—the **whole shebang**; and you've been **bitten by the competition bug**. You spend almost every evening and most of the weekend **driving your F1** car around a series of ever-tighter corners until turning corners feels like an **extension of your personality**. You've worn

out four sets of tires in the last three months, and the motor that came with the kit has so much slop in the bushings that it's hard to believe it still makes the car move. **It's time to modify.**



The Kose rear-pod parts are made out of anodized, machined aluminum and produce a beautiful, solid unit. Kose also supplied the solid Teflon damper washers and damper post; they're smooth and adjustable!

After



WHAT TO BUY

Many F1 owners are afraid to install aftermarket parts on their cars because they think that mods will disqualify them from competing in the parking-lot wars. Nothing could be further from the truth. Most local races are run with a fairly loose set of rules that primarily cover motors and batteries. As long as you run a club spec motor (most rules specify a 24-degree stock can) and a particular type of battery (usually black 1700 SCRC or red 1400 SCR Sanyo cells), you'll be safe.

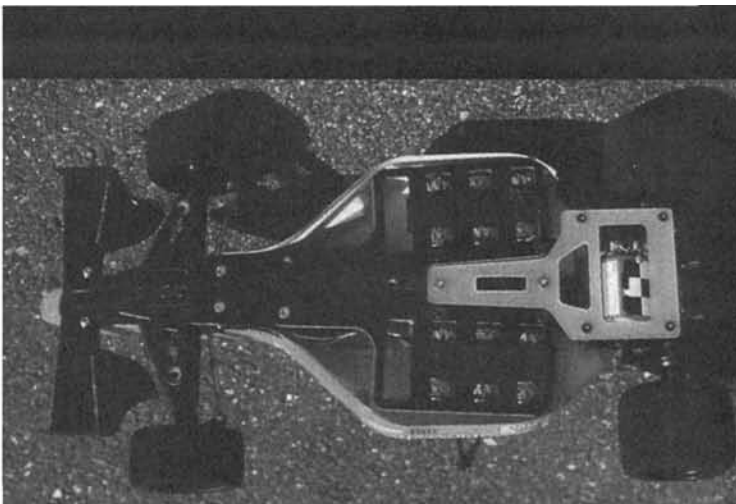
But how do you find out what you should spend your hard-earned money on? Which parts will actually improve the speed, handling and durability of your red-hot asphalt ride? These questions are very important to

me, because I run and race F1 cars all the time. It's my favorite class! To improve my Kyosho* Indycar and Impress F1 and my Tamiya* 103 series cars, I tested a number of aftermarket parts from various manufacturers. Those that worked well enough to reduce lap times or lessen maintenance are included in these two rolling-chassis buildups.

The neat thing about these aftermarket parts is that you can add one or all of the pieces as your desire or budget allows. All of the parts can be installed individually; you can start with just a chassis and then add other parts as you wear out the rest of your stock stuff. On the other hand, you could build an entirely new car from what you see here.

market

by Doug Mertes



The saddle-pack Composite Craft chassis has battery weight distributed evenly for better handling.

Manufacturers, Parts & Part numbers

Buildup

Composite Craft

T-bar
(0.063 inch thick)83009
T-bar
(0.074 inch thick)83010
Graphite upper plate83008
Saddle-pack chassis.....83005
Standard-type chassis...83004

HPI

Articulated arm unit.....8013
Front springs.....A081

Kose

Aluminum body
mountsK5041B
Rear pod.....K5202B
Left-side hub setK5032B
Right-side hub setK5031B
Damper postK5005B
Shock for Tamiya F1 ...K5150B

Kyosho

Flex-plate bridges.....FJW-04
Motor-mounting
plate.....FJW-03
Rear shock absorber...FJW-07

T.M. R/C Racing Components

Turbo wheel disks2435
Quad/2 Racing Chassis ...2497

Tamiya

Ferrari 412T body set....50546
Wheels50532
Front donuts50398
Rear donuts50415
Servo mount58130

Tecnacraft

Heavy-duty rod ends
—early Tamiya F110900
—103 Series F1 cars10905

Boca Bearing

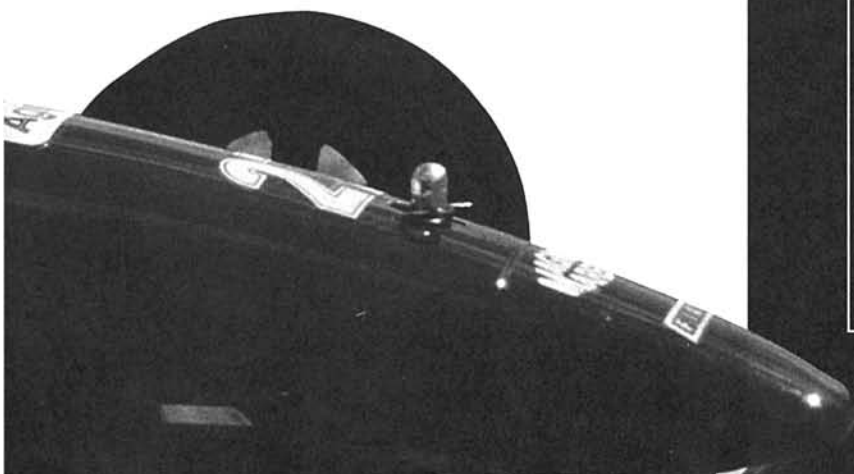
Ultra Seal ball bearings
—RearMR126UU,
MR128UU
—Front.....SFR1-56UU

BRP

Antenna2511

Calandra Racing Concepts

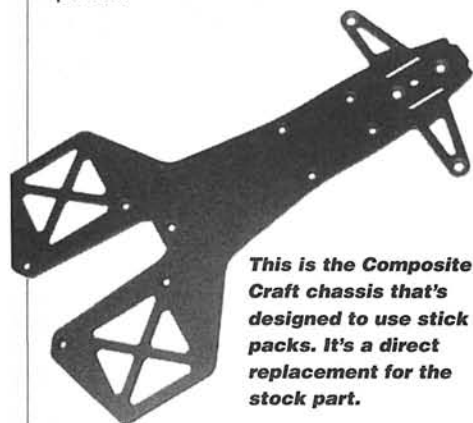
Teflon disks.....4012



TAMIYA 412T DREAM MACHINE

This car is based on Tamiya's hot 103 Series chassis (Lotus 107B, Sauber Mercedes and Ferrari 412). With an updated washer-and-plate rear-pod damping and front suspension, it's their most ambitious, sophisticated F1 chassis yet. It does, however, have a few drawbacks. The main chassis plate is too flexible to handle serious horsepower, the rear pod yields too little traction on asphalt surfaces, and you pretty much have to use batteries in a stick-pack configuration. How can you make one of these 103 Series cars feel rock-solid and sure-footed in the heat of battle?

Chassis. I started with a really stiff, graphite-reinforced chassis plate from Composite Craft*. The F1 chassis is available in a 4x4-cell saddle-pack cut or, if you like the stick-pack format, it's also available in the standard-type pattern like the one that comes with the kit. I like the saddle cut because I can install the same amazing high-voltage on-road packs that I use in my pan cars.



This is the Composite Craft chassis that's designed to use stick packs. It's a direct replacement for the stock part.

Suspension wings. The suspension wings are cut into the plate to protect the front arms from impact on the parking lot. They look really odd until you put the car together; then they make perfect sense. The complete setup also comes with a graphite upper plate and some nifty polished-aluminum standoff hardware.

Rear pod. Made by Kose (Japan) and distributed here by Japan R/C Imports*, the rear pod is made of blue-anodized aluminum. The pod comes assembled but, to ensure that there's no tweak in it, you should take it apart and screw it back together on a flat surface. It's stiff, light and beautiful, and it's probably the most striking piece on the car. Because it's so strong, it does a good job of keeping the rear bearings aligned, even during hard cornering on bumpy surfaces. The metal mass also acts as an effective heat sink during long races on hot summer days.

T-bar. The pod is attached to a Composite Craft 0.063-inch-thick rear T-bar. Although it's a high-quality part and a little thinner than the stock T-bar, I wanted more traction than it could offer, especially on the pavement. I cut two sections of fiberglass out of the T-bar—one between the mounting screws on the tongue and another just in front of the pod mounting screws. Doing this gives the rear end considerably more traction, which I can tune out on high-bite surfaces by tightening the rear flex-plate mounting screw. For very high-traction surfaces, such as Ozite carpet, Composite Craft's 0.074-inch-thick T-bar will do the trick.

Hubs. Kose also makes left-side and right-side hub sets that are blue-anodized to match the rear pod. The hardened aluminum is more durable and runs truer

than the stock plastic parts, so the differential is smoother longer. I used a Du-Mor* 98-tooth, 64-pitch spur gear. The Tecnacraft* F1 fiberglass rear axle also contributes to the buttery smoothness of the differential (the diff side stem is part of the axle). You'd have a hard time breaking, bending, or destroying it. It's lighter than the part that it replaces, and that's rotating weight, too!

Bearings. The rear axle, differential and front wheels run on a set of Boca Bearing's* excellent Ultra Seal ball bearings. The front bearings are American pan-car size ($\frac{3}{16} \times \frac{3}{16}$ inch); that's because the HPI front axles require $\frac{3}{16}$ -inch-i.d. bearings, and the 8mm sockets in the Tamiya Indycar front wheels are close enough to the $\frac{3}{16}$ -inch-o.d. bearing to fit just fine. Ultra Seals are a huge improvement on most other bearings because they require virtually no maintenance. Just brush the dirt and dust off their exterior every once in a while, and they stay perfectly happy. Although they never require lubrication or cleaning, these are some of the smoothest, most reliable bearings you can buy.

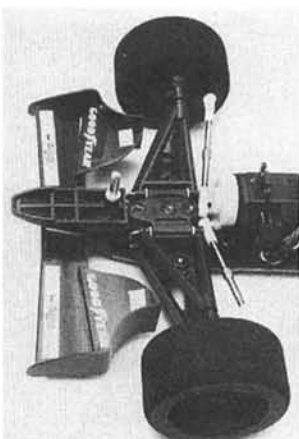
Suspension. The damper washers and rear shock absorber are Kose parts, too. The damper post for the low-friction rear-plate set has a pair of nylon adjustment nuts, one for each of the solid, machined-Teflon™ damping washers. These allow you to fine-tune rear-pod damping action. This setup also comes with slippery pre-cut Teflon tape for the damper plates—nice touch! If you decide to use the stock Tamiya damper post instead, Calandra Racing Concepts* makes a great set of Teflon disks that seem to work just as well. The shock is small, light, adjustable and leak-free, and it comes with a medium-rate spring. You can tighten or soften the spring tension with the finely threaded shock collar; if you're looking for a spring made of thicker or thinner wire, a Trinity* on-road shock spring can be substituted. I use Associated* 30WT silicone shock fluid in mine, and it works great!

Antenna. The chassis doesn't include a provision for an antenna mount, so I used a fiberglass rollover antenna from BRP*. To make it come out of the body in the right place (the Tamiya body has an antenna hole already drilled), I made a small mounting tab out of scrap graphite (those old, broken chassis plates come in handy!). The BRP antenna is stiff (in case the car rolls over on a dot), but it's also flexible and is equipped with a rubber tip to protect the carpeting if I run the car indoors. If your track forbids a stick-type antenna, BRP makes a flexible tubing antenna mount.

Servo. The servo is secured with a Tamiya 103 Series servo mount that comes on a parts tree. To fasten the servo, cut one mounting ear off the servo case. Then apply double-sided tape to the side and front of the case, and slide the servo into the mount. This is a nice, tight system that works beautifully when you attach it to the chassis with flat-head self-tapping screws. It also centers the servo on the chassis for primo steering linkage action. I used Lunsford* titanium turnbuckle links, but you might also want to try Tecnacraft's terrific titanium setup that uses heavy-duty rod ends. They're slick!

Front suspension. The front suspension is a new HPI* articulated arm unit. This is a wonderful, very durable front end, and it can be adjusted a little at a time using the included turnbuckle camber adjusters and caster washers. The front axle can be changed from a trailing position (for oval or slower steering) to an in-line placement for carpet or roadcourses. Be aware, though, that this front end produces a lot of steering, especially if you run the stock rear pod. Start with everything set for slow steering; you can always add more at the track.

Front rims. The Tamiya front rims are offset more than the $\frac{1}{10}$ - or $\frac{1}{12}$ -scale pan-car rims that this front end was designed for. Because this offset makes



HPI's front end is fully adjustable for camber and caster.

the front track wider than the rear, it increases steering response; HPI or JACO* front rims will even things up. In the front end, I suggest that you install the included HPI O-rings instead of springs. HPI has recently released 0.90mm front springs that are heavier than the 0.80mm springs that come with the kit; they're the ideal choice for intermediate traction levels. Try blue-, blue/orange-, or red-compound front tires first, especially on asphalt. I doubt you'll ever use green-compound tires, except possibly on a carpet roadcourse.

Electronics. I installed one of Tekin's* 411-G2 high-frequency speed controls. Its fluid response and torque control are a must for slippery pavements. To prevent electronic interference, remember to solder three 0.01 microfarad (Mf) caps and a 2.2Mf

tantalum capacitor onto the motor! The Novak* NER-3FM receiver provides solid, glitch-free control, even in a hostile parking-lot environment. A matched 1700 SCRC Sanyo* pack assembled with BRP battery bars is secured to the chassis cutouts with Pure Tech* thin nylon and Velcro®-brand fastener battery straps. I used a Futaba* S132H steering servo, but almost any fast, small servo with moderate torque will do (really small servo cases tend to have interference problems with the steering linkage and suspension mounts).

LOOKING GOOD

The entire chassis is covered by Tamiya's Ferrari 412T body set decorated in Jean Alesi colors. The Marlboro stickers were custom-cut by Mike Leahy of ...and Design*, but the rest of the body, the decals and both front and rear wings are strictly out of the box. I still think that Tamiya makes some of the coolest-looking F1 bodies and wings around! That beautiful Lexan shell is held on by Kose polished-aluminum mounts that will never break or wear out.

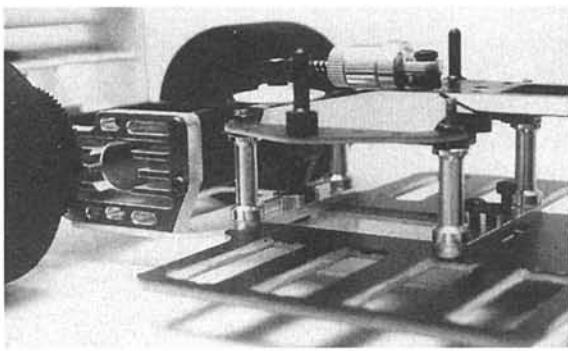
I used Tamiya's larger, 44mm Indycar-size wheels and donuts. I prefer the feel of a large rim and a thin donut to the 37mm rim and thicker rubber that come with most F1 kits. It's my preference. I can usually find regular $\frac{1}{10}$ -scale donuts in a variety of compounds more easily than I can find the F1-size stuff; but JACO is trying to change all that by issuing new F1-size donuts in pink and purple compounds. If you like the 37mm rims, give them a try (the 37mm Tamiya rims won't fit the HPI front end). You'll be surprised at how much traction you get with these natural-rubber tires.

I tested this aftermarket F1 on an unprepared and fairly dusty asphalt surface, and it handled pretty well. Although I didn't time it, the modified car felt faster than a stock F103 car, and I felt more confident through the turns. The tuned T-bar yielded more traction than the stock piece, and the larger rims and thinner foam resulted in a really locked-in feel.

THE RIGHT TOOL FOR THE JOB

The second aftermarket F1 you see here has a Kyosho base. You can use either Impress parts or the Lola Indy/F1 Sport/Stock Car kit to complete the rolling chassis. All the Kyosho cars use similar bolt patterns, so their stuff is interchangeable. Because there are fewer of these cars on the street (compared with the longer-lived Tamiya lineup), there aren't as many hop-up parts available for them; I've managed, however, to make an impressive set of improvements.

Chassis. Once again, I started with an accessory chassis. This one is also in a saddle-pack configuration, but it's cut out of G-10 fiberglass by T.M. R/C Racing Components*. It's called the Quad/2 Racing Chassis. It's thicker than most chassis plates and, even though it isn't graphite, it's exceptionally stiff. The saddle-pack design means that I can move the batteries forward or backward depending on whether I need more rear traction or more steering. This plate



The aluminum shock, the motor mount, the radio posts and the bridges are all Kyosho accessory parts.

has holes for both the older style front end, like the Lola's, and the new articulated front-suspension design found on the Impress.

The chassis-plate kit also comes with a pair of body-mounting posts that replace the side portions of the top damper plate. You have to cut off the original body-mounting posts to mount the new ones, because the old ones make it difficult to secure the saddle-pack batteries. You'll also have to drill new holes in the

body for the posts, because the ears bring the posts closer to the car's center line. You may also find that the front corners of the chassis poke out beyond the front of your F1 body. It's a problem on body shells with short side pods, but not on those styled after Indy-class cars. For a better fit, try the Kyosho Target/Scotch body, the generic Indy/F1 shell put out by Parma*, any of the Dahm's* bodies, or the new Protoform* McLaren or Benetton F1.

Wings. The front bumper wing on this car is one of Kyosho's Williams FW14B designs. It provides just the right amount of downforce as well as some protection for the front suspension. The rear wing is a Tamiya Footwork F1 car part. I trimmed the small lip around the mounting flange so that it would fit the Kyosho pod mounts. Both wings have been primed with Master Modeler primer, then covered with several light coats of Pactra* Daytona Yellow. A final coat or two of Model Master clearcoat provides the shine, and Tamiya Camel decals add the necessary details.

Motor mount/rear shock. The aluminum motor-mounting plate and the rear shock absorber are both Kyosho options. The motor mount provides additional cooling area for the motor, and the rear oil-filled shock is simple, smooth and light. It's superior to the coil-spring ride-height adjuster that comes with the kit. I haven't cut the T-bar on this car yet because previous tests indicated that Kyosho F1 cars inherently have more rear bite than Tamiya F1 cars. If there's a traction problem, however, I'll do the same cut 'n' slice surgery on this car that I did on the Ferrari 412.

Wheels. The front and rear wheels and donuts are new pieces that were just released by T.M. R/C Racing Components. These are green-compound tires—perfect for high-traction parking lots and carpet tracks. They're also available in a full range of foam compounds suitable for outdoor surfaces. Their double-black compound is a bit pricey, but it sticks to asphalt like glue and lasts at least twice as long as green-compound tires! T.M. also makes a line of turbo wheel disks in four colors

(yellow, orange, black and white); they click into place over the outside edges of the rims. They protect the rims and tires from chips and "chunking." To remove them, just pass a thin screwdriver or an Allen wrench through one of the slots in the rims, and pop the disk out from the rear. Unlike adhesive-paper wheel disks, these don't tend to come off while racing!

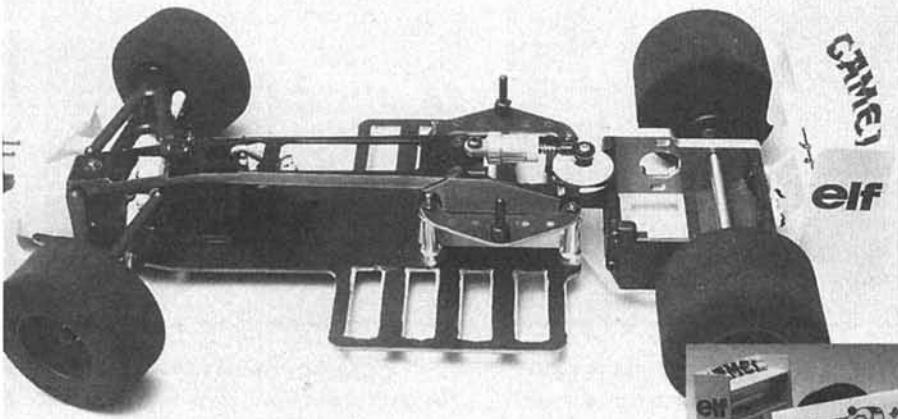
These T.M. R/C Racing Components wheels and Turbo caps are the hot tickets if you want to prevent your tires from "chunking"!

Radio posts/flex-plate bridges.

I used Kyosho's aluminum radio posts and flex-plate bridges, too.

They're much stiffer than the stock plastic pieces, and they look very flashy. Put a little Shoe-Goo on the tweak-screw threads, and they'll stay adjusted longer.

I used a Futaba 9601 steering servo captured by Kyosho's stock servo mount. The steering linkage is made up of Robinson* titanium ball ends, Associated ball cups and Lunsford titanium steering links. This front end can take a hard whack and keep on rolling, and that's important in the rough-and-tumble world of parking-lot racing!



The Kyosho car uses a saddle-pack chassis design; this one is by T.M. R/C Racing Components.



Any of the Kyosho F1 or Indy body sets will fit; these are Williams FW14B pieces.

F1 RACING IS HERE TO STAY

Every month brings some new part or design that makes these cars faster, more durable and easier to set up. Overall, this remains one of the least expensive classes in which to

participate. Most organizations separate the racers into two groups: those with box-stock cars and those with modifications. That makes sense, because you can get a lot of experience with the stock parts before you

really need to start replacing them. By then, you'll probably be ready to run with the big dogs, anyway. See you on the lot!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

HOW TO



Shoot 'em up

by John Howell

Photos by John Howell

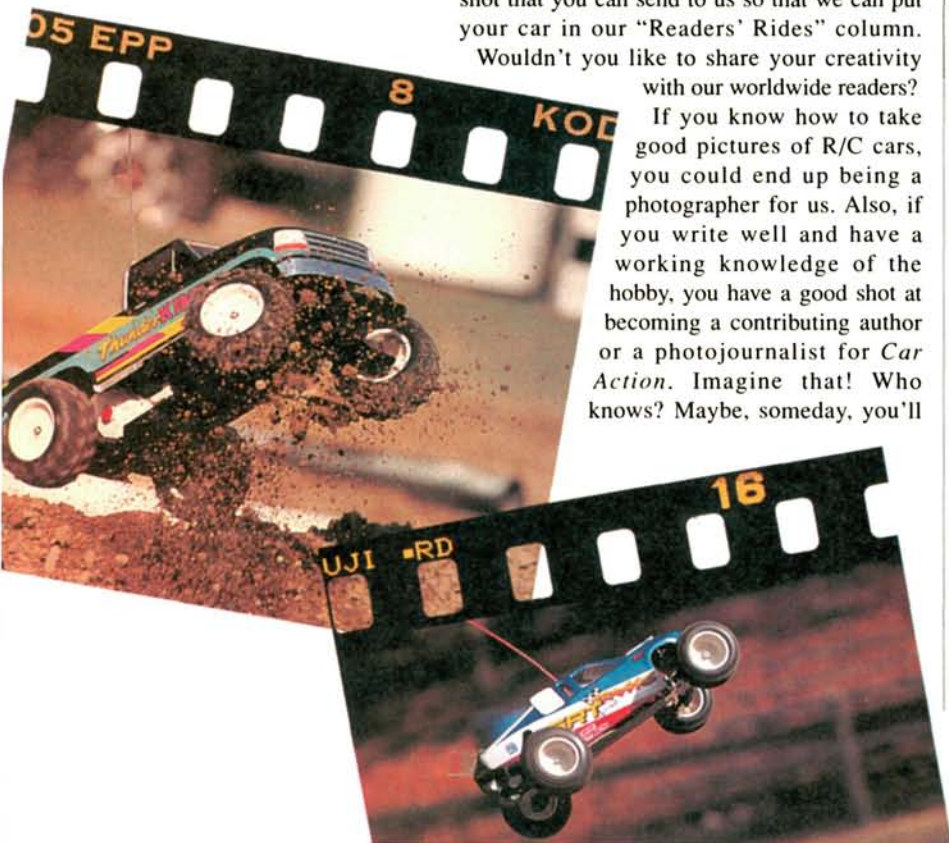
R/C Car Photography 101

I KNOW WHAT you're thinking: "Why do I need to know how to photograph my R/C car?" Here's why: you might want a killer shot that you can send to us so that we can put your car in our "Readers' Rides" column.

Wouldn't you like to share your creativity with our worldwide readers?

If you know how to take good pictures of R/C cars, you could end up being a photographer for us. Also, if you write well and have a working knowledge of the hobby, you have a good shot at becoming a contributing author or a photojournalist for *Car Action*. Imagine that! Who knows? Maybe, someday, you'll

be helping us test the latest, coolest equipment, or you'll be heading off to cover races across the country for the magazine! When you've finished reading this article, I hope you'll at least be able to go out and get that killer shot of your car that you've always wanted.



CHOOSING A CAMERA

Obviously, the first step is to get your hands on a camera. If you don't have one, then you might be able to borrow one from a friend or a relative. Basically, there are two types of camera:

- Point-and-shoot-style cameras have a fixed lens that's either a single focal-length lens or a zoom lens that covers a wide field.
- SLR (single lens reflex) cameras have interchangeable lenses.

Of the two types, cameras with interchangeable lenses are more versatile than those with fixed lenses. You can still get a good shot with your point-and-shoot camera; you just have to take a slightly different approach.

SELECTING FILM

Many types of film are on the market—so many, in fact, that it gets confusing sometimes. Black-and-white film, color film and film for color slides are available in a variety of speeds. The number on the film's container, i.e., 100, 200, 800, or 1,000, represents the film's speed or ASA. Basically, low-speed film, i.e., 100 and 200 ASA, absorbs light that comes through the camera lens more slowly than high-speed film, i.e., 800 and 1,000 ASA. Low-speed film works well on sunny days; high-speed film works well on cloudy days and at sunset. Also, low-speed film produces a better photograph than high-speed film, which produces a grainy photograph.



When we go on a photo shoot, we always use 100 ASA slide film because the quality of the pictures will be better; slides produce the best color reproductions. Also, within minutes, a 35mm slide can be scanned into our computers using an electronic image scanner.

We could use color-print film but, for the best results, we stick to 35mm slides. If you're shooting for our "Readers' Rides" column, color prints are acceptable, but if you want to shoot some slide film, we'll gladly take that, too.

SETTING UP THE PICTURE

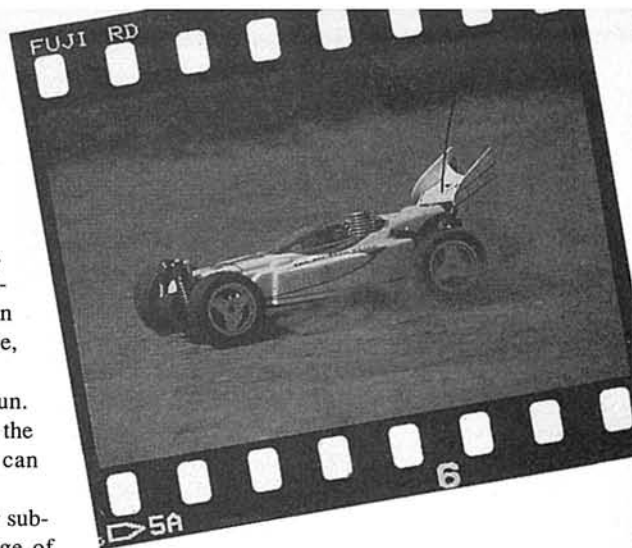
OK—your camera and film are ready; now it's time to set up your shot. You must decide whether you want a still shot or an action shot. Still photography is relatively simple. You can control all the variables, and you have time to set up everything perfectly. You don't need a fancy camera to get a decent still photo; even a disposable camera will do the trick. Follow these tips, and you'll be on your way to grabbing that killer shot.

- Make sure that your vehicle is clean. Dusty, dirty cars don't photograph well.
- Shoot the vehicle in its element. If you own an off-road car, photograph it in the dirt. If you have an on-road car, plop it down on a nice, clean stretch of pavement.
- Shoot with your back to the sun. Shooting toward the sun distorts the light coming into the lens and can produce glare on the photo.
- Get down low and close to your subject. Don't shoot when the image of your car is too small to fill the frame. Fill most of the frame with what you're trying to show. Don't get too close either. Some point-and-shoot cameras and disposable cameras can't focus on objects that are too close. Stay roughly 2 to 3 feet away when you use these types of camera.
- Photograph the car from various angles. On occasion, we've received 10 shots of the same car in a "Readers' Rides" entry, and all the shots look the same. Try for a little variety.

- Look around before you snap the picture. Is there anything distracting in the background? Is your neighbor's dog running around in the shot? Make sure the shot is "clean."
- Stay away from the grass. We receive a ton of "Readers' Rides" photos that have been shot on the grass, and few make it into the magazine. Trust me; for some reason, R/C cars don't photograph well on your lawn.
- If possible, shoot your car outdoors. A lot of people put their vehicles on a rug or a bed and, because indoor lighting is usually poor, the shots come out dark.
- Experiment with a flash. If your camera has a manual or detachable flash, use it—even in broad daylight. You'll be surprised at how fill-in flash can make subtle highlights pop out and grab your attention.

ACTION PHOTOS

Getting good action photos is pretty hard stuff. If you want to take action shots, you're better off with an SLR camera that has interchangeable lenses and shutter speeds that you can set. You can get reasonable action shots with point-and-shoots, but it will be much harder. I've taken action shots of full-size Mickey Thompson stadium trucks, motocross races and a lot of other motor sports, but shooting R/C cars is the hardest thing I've ever shot. I'm not trying



to discourage you from taking action shots; I just want you to know up front that it takes a lot of work to get killer shots.

John Huber and I take a lot of action shots for the magazine. When we shoot action, we don't just shoot one roll; we usually shoot five or six rolls each—that's a total of 180 to 216 photos! And if we go to a race, we'll shoot between 10 to 15 rolls, or about 540 pictures! Do you want to take a guess at how many of those pictures come out the way we want them to? For a typical "Thrash Test" photo shoot, maybe 20 of the 216 photos that we take are really killer shots. The rest go right into the trash can. So don't expect every picture to be sharp and clear; it just doesn't happen. If, out of your whole roll of film, you get one photo that makes you say, "Wow, this is a killer shot," then you've accomplished your mission. Here are some general tips that will help you get that *Car Action* cover shot.

- Use a shutter speed of $1/500$ second. Anything slower might produce blurry photos. If you have a camera that gives you the option of selecting shutter speeds in the $1/320$ to $1/400$ range, try those, too. If you're taking on-road shots, and you want the wheels to be blurred, try shooting at $1/250$ second, but keep in mind that the photos might not be as sharp.
- If your camera has different program modes, always select the mode that gives you fast shutter speeds or the option to choose fast shutter speeds. Some cameras are programmed to pick both the shutter speed and the aperture of the lens, and the result is that you get shutter speeds that are too low to produce good action shots.
- Use the longest lens or longest zoom position possible. If your camera has a fixed lens with a 28-100 zoom, put the zoom on 100. If you have a 100-300 zoom lens, set it on 300.
- Fill the frame! Get close to the subject you're shooting.
- Take a side shot of your vehicle; it's easier.

Cars or trucks coming straight at you are harder to capture on film.

- Turn off your auto-focus system if you can, and pre-focus on a given spot. I've tried a lot of cameras using this method, and Canon's auto-focus system is the only one I've found that produces sharp action shots. If you can't turn off the auto-focus on either your camera or your lens, tell the person driving your vehicle to slow it down; then take the pictures. It's easier to get a good action shot if the vehicle is moving at between half and full speed.

- To pre-focus, pick a spot on the dirt or in the street, set the car on that spot, and focus on it while it's stationary. Then have a friend drive the car so that it makes several passes over the exact spot where you focused on it.

- To get a good shot, use a technique called "panning." Don't just sit there looking at the pre-focused spot. Follow the car around while you look through the camera. If you look only at the pre-focused spot, by the time the car gets to the spot, you won't have enough time to react, and the car will be out of your focus range. Follow the car around so that you'll be ready for it as it gets to your designated in-focus position. If your camera has a motor drive, use it. Start shooting pictures as the car gets closer to the spot.

- After your slides have been developed, you can look at them through a loupe—a small magnifying glass you'll find at most camera stores. Use the loupe to see whether the images are sharp. Are the stickers on the car in focus? If everything is blurry, it's time to try again. Remember, practice makes perfect!

So now that you have a general idea of how to take a good photo, clean off your machine, grab your camera, and start shootin'. Here's the deal: we're going to have a little contest. Send us your best shots. (Professional photographers need not apply!) There will be two categories: Best Still Photo and Best Action Photo. The winners will receive a two-year complimentary subscription to *Car Action*, and their photos will appear in Chris's "Back Lot" column. You have until September 15, 1995, to turn in your works of art.

Send your entries to: R/C Car Action Photo Contest, 251 Danbury Rd., Wilton, CT 06897. Include your name, address, telephone number, info on the car and type of camera equipment you used to get the shot. If we don't pick your shot as the winner, we might still show it in "Readers' Rides." So what are you waiting for; get to work!

Finish First with Pactra!



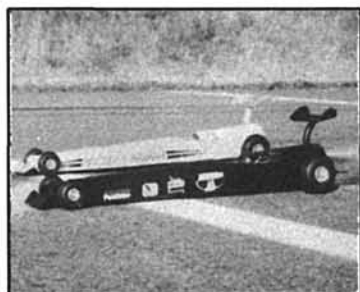
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National Organization for Racing Radio-Controlled Autos

Contact: J.R. Sitman

(Administrator),

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Upland, CA 91786.

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fax (909) 944-2996

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Radio Control
CAR ACTION
PRO-LINE

9th Annual
Cactus



classic

by Frank Masi



PHOTOS BY FRANK MASI

IF YOU SHOW people a good time, they'll always come back. Sometimes, they'll even bring their friends. Such was the case at the ninth annual Pro-Line®/Car Action Cactus Classic, which boasted an all-time attendance high of 430 entries!

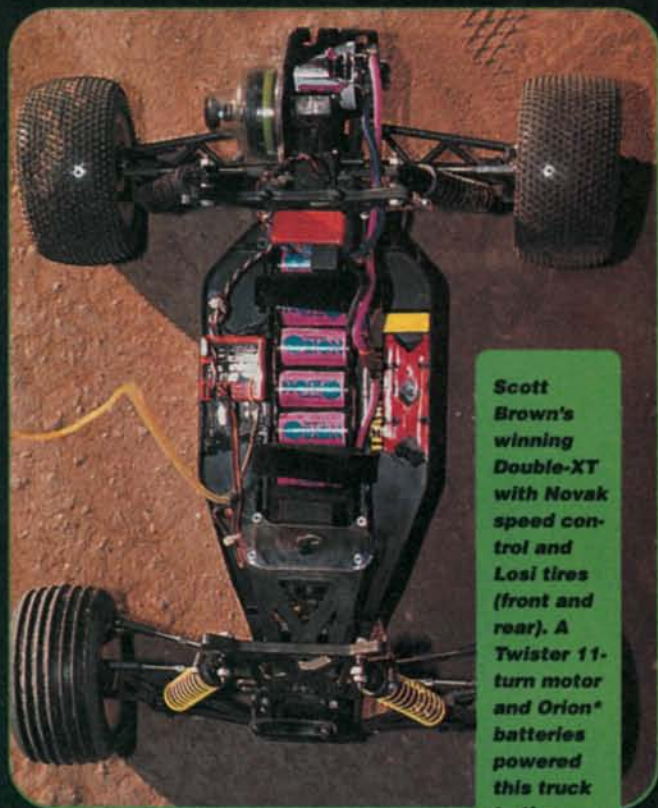
Held at SRS Raceway in Tempe, AZ, the Cactus is one of the few "non-national" races that attracts a strong contingent of factory-sponsored drivers. Racers representing companies such as Team Associated®, Team Losi®, Pro-Line, Race Prep®, Peak Performance® and RPM® were present, as were hundreds of non-sponsored entrants. This turnout promised that the racing action would be even hotter than the beautifully sunny Arizona weather.



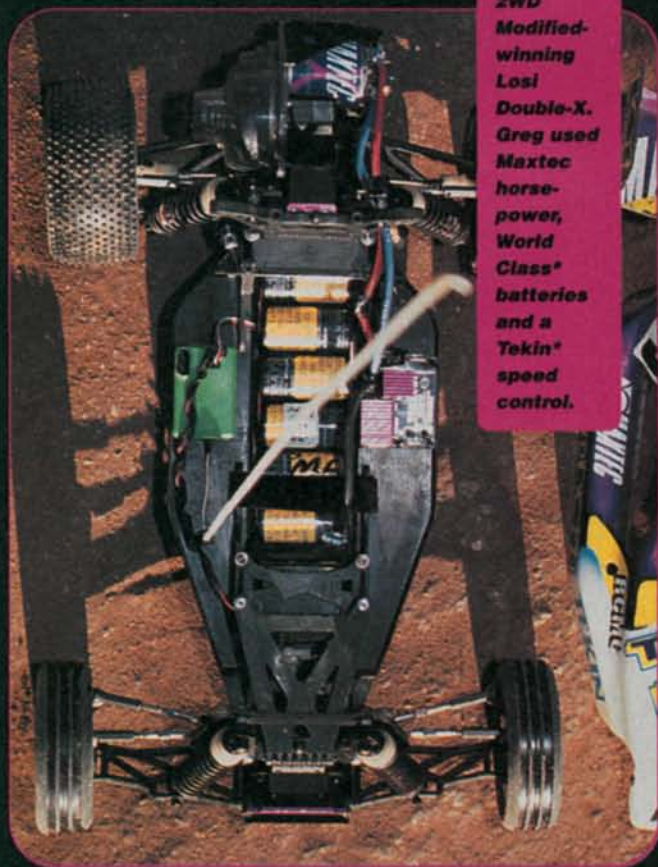
Desert Duel



The Cactus boasts a relaxed atmosphere that you just don't find at many other races of this caliber. There's no radio impound or any lap-counting transponders, but surprisingly, I didn't hear a single driver complain of getting a radio "hit," or that their laps had been counted incorrectly.



Scott Brown's winning Double-XT with Novak speed control and Losi tires (front and rear). A Twister 11-turn motor and Orion® batteries powered this truck to the Modified win.



Greg Hodapp's 2WD Modified-winning Losi Double-X. Greg used Maxtec horsepower, World Class® batteries and a Tekin® speed control.

Novice Class Winners

The Cactus Classic is one of the few "big" R/C car races that has classes for beginners. To avoid the frustration that can result from competing against more experienced drivers, newcomers can enter both the 2WD buggy and truck novice classes, which follow the same rules as the stock classes do.

• **2WD Novice.** Gerry Marcelino of Chula Vista, CA, TQ'd and took the A-Main win. Gerry drives a Team Losi Double-X buggy with a Peak Performance "Beast" stock motor and, of course, he sponsors himself!

• **Truck Novice.** Gerry Marcelino TQ'd again, but Traci Howard (below) from Whittier, CA, came from fourth position on the grid to win the A-Main. Traci's ride of choice is a Team Losi Double-XT with a Trinity Green Machine 2 stocker under the hood.



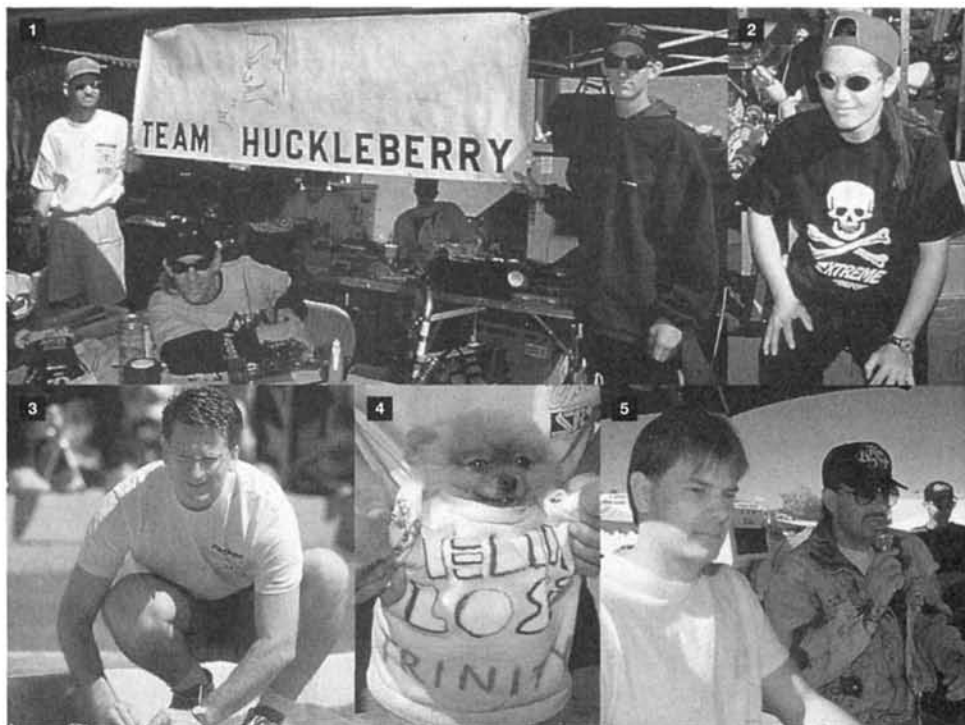
Novice Results

2WD

POS.	DRIVER
1	Gerry Marcelino
2	Greg Vinas
3	Robert Maggard
4	Mike Friery
5	Wayne Aymer
6	Dustin Lewis
7	Eric Flinn
8	Fred Markham
9	Irv Eldridge
10	Dennis Heath

TRUCK

POS.	DRIVER
1	Traci Howard
2	Gerry Marcelino
3	Tony Nesbit
4	Pete Norman
5	Dan Johnson
6	David Kading
7	Jeff Kading
8	Robert Maggard
9	Dwayne Pengilly
10	Bill Smith



1. Team Huckleberry was out in force. I'm not exactly sure how to become a member, but I think "couch fishing" is one of the criteria. 2. Derek Furutani was one of the two "triathlete" drivers at the Cactus who made all three modified A-Mains (the other driver was Greg Hodapp). Derek has been practicing a lot lately! 3. Pro-Line president Todd Mattson puts a fellow racer's car down on the starting grid. Yes, Todd raced at the Cactus, and yes, he did have lots of traction. 4. I think this is a dog...but I'm not sure...it didn't move all weekend! 5. SRS's Scott Anfinson (left) counts the cars as announcer Jim Jankowski calls the racing action.

In addition to the "normal" racing classes—2WD Stock and Modified, Truck Stock and Modified, and 4WD Modified—the Cactus had a forum for Truck and Buggy Novice and 4WD Stock. That's eight classes of racing! That must be some sort of record!

THE TRACK

The SRS track is hard-packed and proved consistent throughout Friday's and Saturday's qualifying rounds and Sunday's Main events. The cars begin the course on a long straight-away that passes in front of the drivers' stand. They follow a short, right-hand sweeper, clear two sets of small double jumps and a small, left-hand carousel. Heading up a short, inclined straight to a hairpin right, the cars then head downhill to a challenging, gradual "S" that has a double jump in its center. After a difficult-to-judge right and a long, downhill straight and triple jump, it's back onto the main straight for another lap.

CLASSIC RACING ACTION

Two rounds of IFMAR-style qualifying (in which each car is timed separately) were held on Friday, and another two rounds were held on Saturday. The 2WD Modified and the Truck Modified classes used a three-A-Main format, while the other classes used single A-Mains.

• **Truck Modified**—a battle between Team Losi's Double-XT and the all-new RC10T2

from Associated. Scott Brown, fresh from a win in the truck class down at the Florida Winter Champs, put his Twister-powered Double-XT on the pole. In the first of the three Mains, Mark Pavidis' Reedy-powered T2 got out front and was gone. Brown fought off charges from Derek Furutani and Greg Hodapp to finish second. Rick Hohwart turned on the heat in the second Main and drove his Peak Performance-powered T2 across the finish line first. Mark Francis' T2 crossed next, followed by Brown's Double-XT. In the third and deciding Main, Brown laid down a blistering run to take the checkered flag and the overall win. He was followed by Associated's Matt Francis and Greg Dennett, both of whom drove new T2s. When the points were tallied, it was Brown followed by Hohwart and Pavidis. Six new Associated trucks and four Double-XTs made up the Main.

• **2WD Modified.** Greg Hodapp was the man to beat in this class. He put his Maxtec*-powered Losi Double-X buggy comfortably on the pole and shot out to the lead in the first Main. Matt Francis broke away from the pack and tried to chase down Hodapp; he got within striking distance at the 3-minute mark. Hodapp stepped it up to maintain a safe distance from Francis' Reedy-powered RC10, but on the last lap, a lapped car became wedged between Hodapp and the finish line and allowed Francis to skate by for the win. Not to be denied, Hodapp pro-

TRUCK MODIFIED

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	1	Scott Brown	Losi XXT	Twister 11/Orion	Novak	JR 756	Losi/Losi	Losi
2	5	Rick Hohwart	Assoc. T2	Peak 13/Orion	Novak	Futaba	Pro-Line/Pro-Line	Assoc.
3	8	Mark Pavidis	Assoc. T2	Reedy Sonic M/Reedy	Novak	Airt. 3Ps	Pro-Line/Pro-Line	Assoc.
4	7	Derek Furutani	Assoc. T2	Extreme/World Class	Tekin	Sanwa	Pro-Line/Pro-Line	Assoc.
5	10	Matt Francis	Assoc. T2	Reedy/Reedy	Tekin	Airt.	Pro-Line/Pro-Line	Assoc.
6	2	Greg Dennett	Assoc. T2	Reedy Sonic M/Reedy	Tekin	Airt. CS2P	Pro-Line/Pro-Line	Assoc.
7	6	Mark Francis	Assoc. T2	Reedy/Reedy	Novak	Airt.	Pro-Line/Pro-Line	Assoc.
8	3	Greg Hodapp	Losi XXT	Maxtec/World Class	Tekin	Airt. 3Ps	Losi/Losi	Losi
9	4	J.D. Beckwith	Losi XXT	Trinity 13/Trinity	Novak	Airt. CS2P	Losi/Losi	Losi
10	9	Mike Weed	Losi XXT	Twister 13/Orion	Novak	Airt. CS2P	Losi/Losi	Losi

2WD MODIFIED

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	1	Greg Hodapp	Losi XX	Maxtec/World Class	Tekin	Airt. 3Ps	Losi/Losi	Jammin'
2	5	Matt Francis	Assoc. RC10	Reedy/Reedy	Tekin	Airt.	Pro-Line/Pro-Line	RCPS
3	6	Mark Pavidis	Assoc. RC10	Reedy Sonic W/Reedy	Novak	Airt. 3Ps	Pro-Line/Pro-Line	RCPS
4	7	Jimmy Babcock	Losi XX	Maxtec/Ballistic	Novak	Airt.	Losi/Losi	Jammin'
5	3	Jay Robinette	Losi XX	Extreme/World Class	Novak	Airt.	Losi/Losi	Jammin'
6	7	Derek Furutani	Assoc. RC10	Extreme/World Class	Tekin	Sanwa	Losi/Pro-Line	RCPS
7	4	Scott Brown	Losi XX	Twister 13/Orion	Novak	JR 756	Losi/Losi	Jammin'
8	10	Jack Johnson	Losi XX	Twister 13/Orion	Novak	JR 756	Losi/Losi	Jammin'
9	9	Mike Weed	Losi XX	Twister 12/Orion	Novak	Airt. CS2P	Losi/Losi	Jammin'
10	2	Jim Gard	Losi XX	Race Prep/Ballistic	Tekin	Airt. 3Ps	Losi/Losi	Jammin'

4WD MODIFIED

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	2	Greg Hodapp	Yokomo	Maxtec/World Class	Tekin	Airt. 3Ps	Losi/Losi	Yokomo
2	3	Jason Ashton	Yokomo	Race Prep/Integy	Tekin	Airt.	Losi/Losi	Yokomo
3	1	Derek Furutani	Yokomo	Extreme/World Class	Tekin	Sanwa	Losi/Losi	Yokomo
4	5	Chris Stahl	Schumacher	Badd Boyz/Badd Boyz	Tekin	Airt. CS2P	Pro-Line/Pro-Line	CAT 2000
5	4	Bryce Beaver	Yokomo	Reedy/Reedy	Tekin	Airt.	Pro-Line/Pro-Line	Yokomo
6	10	Peter Hoffelder	Yokomo	Evolution/Mega	YM	Futaba	Pro-Line/Pro-Line	Yokomo
7	7	Kevin Sharp	Yokomo	Reedy 12/Reedy	Tekin	Airt.	Pro-Line/Pro-Line	Yokomo
8	8	Ray Parnall	Yokomo	Peak 11/Orion	Novak	Airt.	Pro-Line/Pro-Line	Yokomo
9	9	Edward Mullen	Schumacher	Precision/Orion	Tekin	Airt. CS2P	Losi/Losi	CAT 2000
10	6	Aldo Ruiz	Kyosho ZX-R	Peak 12/Orion	Tekin	Futaba	Losi/Losi	Optima Mid

TRUCK STOCK

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	1	Steve Butts	Losi XXT	Extreme/World Class	Tekin	Airt.	Losi/Losi	Losi
2	3	Richard Trujillo	Losi XXT	Peak/Orion	Tekin	Airt. CS2P	Losi/Losi	Losi
3	-	Derek McCann	-	-	-	-	-	-
4	4	Brandon Aymer	Losi XXT	Matrix/Integy	Tekin	Airt.	Losi/Losi	Losi
5	9	Gary DeLeon	Losi XXT	Motor Man	Tekin	Futaba	Losi/Losi	Losi
6	-	Billy Calay	Losi XXT	Race Prep/ESP	Tekin	KO-Propo	Pro-Line/Pro-Line	Losi
7	-	Steve Rapp	-	-	-	-	-	-
8	7	Dave Pease	RPM	Proc./Competition	Tekin	Airt.	Pro-Line/Pro-Line	Assoc.
9	-	Chuck Erickson	-	-	-	-	-	-
10	2	Jason Ashton	Losi XXT	Race Prep/Integy	Tekin	Airt.	Losi/Losi	Losi

2WD STOCK

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	1	Jimmy Babcock	Losi XX	Maxtec/Ballistic	Novak	Airt.	Losi/Losi	Jammin'
2	3	James Gallatin	Losi XX	Extreme/Montana	Novak	Airt. CS2P	Losi/Losi	Jammin'
3	2	Matt Lee	Losi XX	Badd Boyz/Badd Boyz	Tekin	Airt. CS2P	Losi/Losi	Jammin'
4	9	Jerry Walter	Losi XX	Race Prep/Stealth	Novak	Airt. CS2P	Losi/Losi	Jammin'
5	5	Brent Thielke	Assoc. RC10	Twister/Orion	Novak	Airt. 3Ps	Losi/Pro-Line	RCPS
6	10	Dave Bonfroy	Losi XX	Extreme/World Class	Novak	Airt.	Losi/Losi	Jammin'
7	-	Richard Lake	Losi XX	Precision/Max Cell	Tekin	Airt. CS2P	Losi/Losi	Jammin'
8	-	Albert Guardado	-	-	-	-	-	-
9	7	Rob Moots	Losi XX	Motor Man/Orion	Tekin	Airt. CS2P	Losi/Losi	Jammin'
10	-	Levi Noble	-	-	-	-	-	-

4WD STOCK

POS.	QUAL.	DRIVER	CHASSIS	MOTOR/BATTERY	ESC	RADIO	TIRES (F/R)	BODY
1	1	Ryan Mallfield	-	-	-	-	-	-
2	2	Ray Parnall	Yokomo	Peak/Orion	Novak	Airt.	Yokomo/Yokomo	Yokomo
3	3	Dave Pease	Yokomo	Proc./Competition	Tekin	Airt.	Pro-Line/Pro-Line	Yokomo
4	4	Les Burdine	Schumacher	Race Prep/ESP	Tekin	Futaba	Pro-Line/Pro-Line	CAT 2000
5	-	Jim Thomas	-	-	-	-	-	-
6	7	Wade Eldredge	Schumacher	Motor Man/Trinity	Novak	Airt.	Pro-Line/Pro-Line	BossCAT
7	10	Jeff Horn	Schumacher	Motor Man/Stealth	Novak	Airt. XL2P	Pro-Line/Pro-Line	BossCAT
8	8	Rick Stahl	Schumacher	Badd Boyz/Badd Boyz	Tekin	Airt. CS2P	Baldies/Smoothies	CAT 2000
9	9	Jack Wilson	Yokomo	Trinity/Perf. Match	Tekin	Airt.	Pro-Line/Pro-Line	Yokomo
10	-	Tim Miles	-	-	-	-	-	-

ceeded to win the two following Mains and cinched the overall win. With a first-, third- and sixth-place finish, Matt Francis secured second, and Pavidis' Reedy-powered RC10 took third overall.

• **4WD Modified.** Qualifying for this class was a seesaw battle between the Yokomos of Furutani and Hodapp. During the final qualifying round, Furutani's Extreme Motorsports*-powered YZ-10 edged out Hodapp's Maxtec-powered YZ-10 to take the top spot. In the Main, Furutani shot out to the lead at the sound of the horn, but Hodapp was still hot from his 2WD win and made a clean pass at about the 2-minute mark. With Hodapp out in front, Jason Ashton made a bid for the second spot, but Furutani held on. With just seconds to go, Furutani became tangled in traffic, and that allowed Ashton's Race Prep-powered YZ-10 to slip by for second.

• **Truck Stock**—the closest race of the weekend. Steve Butts, the winner of last year's event, was looking for a repeat performance. He secured the top qualifying spot with his Losi Double-XT, but I doubt he knew what third-qualifier Richard Trujillo had in store for him. Butts holed out the field and looked confident

out front, but Trujillo's Double-XT soon crept up from behind and stuck like glue to Butts' bumper. The two Losi trucks remained locked in combat for 4 minutes, repeatedly swapping the lead. At the buzzer, Butts edged Trujillo out for the win, but if there could be two first-place trophies, these drivers would each get one!

• **2WD Stock** belonged to Team Losi's Jimmy Babcock, who led throughout qualifying. The closest any of the other cars in the Main got to Babcock's Double-X was at the starting grid. At the horn, Babcock gave a mighty "C-ya" and was gone, slowing only to pick up his trophy! The real battle was for second place between third-qualifier James Gallatin and second-qualifier Matt Lee, both of whom drove Double-Xs. In the end, Gallatin edged Lee out for the second spot.

• **4WD Stock.** If you read last year's coverage of this event, you'll remember seven-year-old "Flyin" Ryan Maifield. Well, he's



Concours-winner Jay Robinette (left) holds his winning Losi Double-XT and the Car Action concours cup. Second-place winner Jason Ashton is on the right.

eight now and even faster on the track. Ryan TQ'd the 4WD Stock class by a substantial margin, then swept the Main with a flawless, wire-to-wire victory. Ray Presnell held off a hard-charging Dave Pease to take the second spot. Both drivers used Yokomo YZ-10 buggies.

SEE YOU NEXT YEAR!

The Cactus Classic is put on by racers, for racers. There's no national title at stake—just bragging rights. If you enjoy top-level competition without a lot of pressure, all in a very laid-back atmosphere, set aside a few days next March to come out to this race; you won't regret it. Special thanks to Mike Dolan and Scott Anfinson, and to Ken, Gene, Ray, John and Jack...all of whom make this race happen.

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.

THIRD ANNUAL ENDLESS SUMMER CLASSIC

SPONSORED BY **PRO-LINE**
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HOSTED BY MnM HOBBIES

**Location: MnM Hobbies, Corona, CA
SEPTEMBER 16-17, 1995**

CLASSES: 2WD Stock, 2WD Modified, 2WD Sportsman, Stock Truck, Modified Truck and Sportsman Truck.

RACING PROGRAM: A-B-C

SCHEDULE: Friday—practice; Saturday—two qualifying rounds; Sunday—one qualifying round and Mains.

ENTRY FEE: \$35 first entry; \$30 each additional entry. Limit three entries per driver. First entry includes event T-shirt.

RULES: ROAR rules apply

TROPHIES: presented on Sunday after the Mains
Entry deadline: September 1, 1995 (limited to 300 entrants)

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Sportsman Class provides handout motors, batteries and tires—a class for true sportsmen who want to race in an "even field." Handout batteries are returned to the event organizer at the end of the Mains.

FREQUENCIES:

2WD Stock	1st: _____ 2nd: _____ 3rd: _____	Stock Truck	1st: _____ 2nd: _____ 3rd: _____
2WD Modified	1st: _____ 2nd: _____ 3rd: _____	Modified Truck	1st: _____ 2nd: _____ 3rd: _____
2WD Sportsman	1st: _____ 2nd: _____ 3rd: _____	Sportsman Truck	1st: _____ 2nd: _____ 3rd: _____
4WD Modified	1st: _____ 2nd: _____ 3rd: _____		

Make checks payable to: MnM Hobbies, 137 N. Vander Street, Corona, CA 91720



TRINITY Dirtinator Modified Motor

*The complete recipe for
making a faster motor*

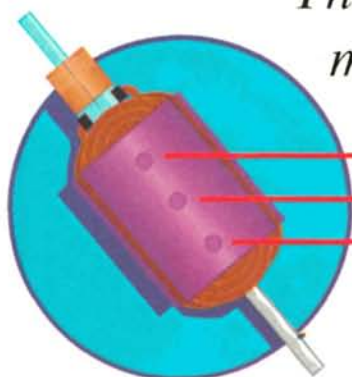


Figure 1- As you can see with this conventionally balanced armature, holes are drilled into the top of the laminations.

by JOHN HOWELL

PHOTOS BY WALTER SIDAS

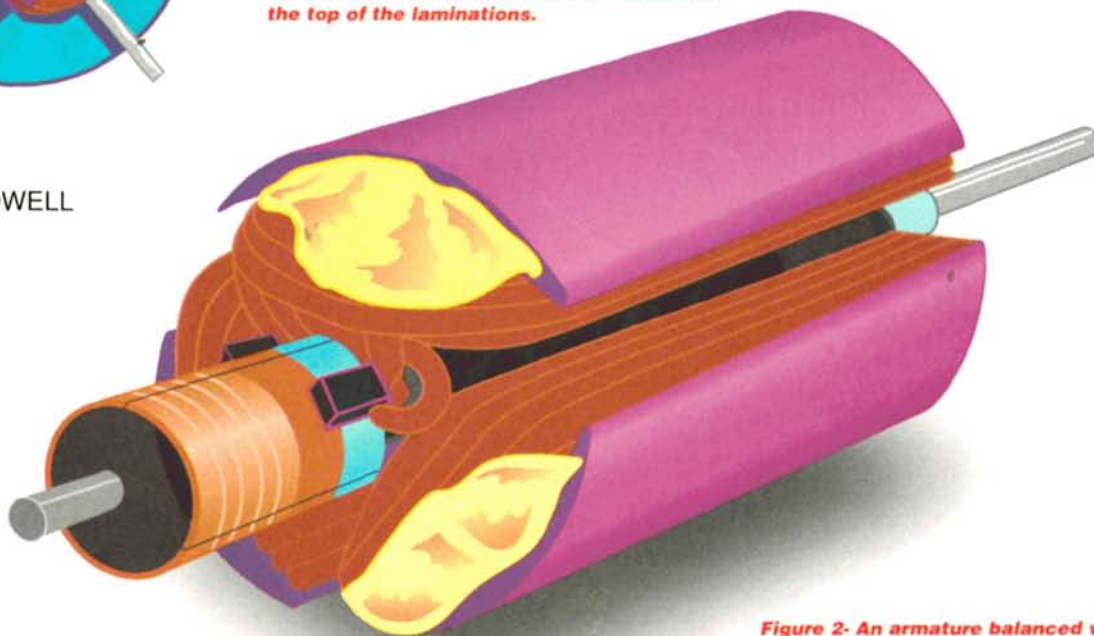


Figure 2- An armature balanced with epoxy creates a stronger magnetic field for a more efficient and powerful motor.

WHEN IT COMES to electric off-road racing, people are always trying to go faster. One of the easiest ways to do this is to toss a hot modified motor into your ride. One company that often sets new standards in motor development is Trinity Products*. With the introduction of their newest motor lineup—Kinwald Dirtinator motors—Trinity has once again proven that they are on the cutting edge of motor technology. Let's take a look at what separates this motor from the rest of the pack.

AWESOME ARMATURE

The new Trinity Dirtinator modified motor is based on the company's popular Team Kinwald modified motor setup. The major difference between the two is the Dirtinator's new, epoxy-balanced armature, which is becoming more popular in high-performance motors.

After an armature has been assembled and wound, it must be balanced. To do this in a conventional armature setup, the tops

of the armature's laminations (Figure 1) are drilled out slightly to counterbalance the entire assembly. Think of it this way: have you ever taken your car to a mechanic to get your tires rotated and balanced? If so, do you remember watching them place several small chunks of metal on your wheels? Well, if you've witnessed this procedure, then you can relate to how a motor's armature is balanced but, instead of *adding* pieces of metal to the armature, small sections are *drilled out* to balance the assembly.

To balance an epoxy-balanced armature, small amounts of high-density/high-strength, heavyweight epoxy are placed on the ends of the light sides of the armature poles to make them the same weight as the heaviest pole (Figure 2).

Now you know what an epoxy-balanced armature is; to find out what its advantages are over a standard, drilled-out armature, read on.

MORE POWER TO YOU

When laminations are drilled to balance a heavy section of an armature, a small amount of material is removed. Magnetic material is also removed, and this shorts out the thin laminations that make up the armature poles, which, in turn, creates a magnetic "soft spot." This results in a weaker magnetic field and a less powerful motor. The total magnetic mass of the armature affects the amount of power that a motor produces. An epoxy-balanced armature eliminates "soft spots" because no drilling is involved. This method balances the armature perfectly without drilling and disrupting the magnetic field, and it produces a cooler-running, more

TEAM KINWALD DIRTINATOR MOTORS

KDO509	Dirtinator 9-turn Quint Modified Motor	\$95
KDO410	Dirtinator 10-turn Quad Modified Motor	\$95
KDO411	Dirtinator 11-turn Quad Modified Motor	\$95
KDO312	Dirtinator 12-turn Triple Modified Motor	\$95
KDO313	Dirtinator 13-turn Triple Modified Motor	\$95
KDO214	Dirtinator 14-turn Double Modified Motor	\$95
KDO215	Dirtinator 15-turn Double Modified Motor	\$95

• Armatures available separately for \$49

powerful, efficient motor.

The Kinwald Dirtinator has a black motor can and an endbell that are easy to identify. The 1.3mm-thick, ROAR-legal can and the stand-up brush-type endbell are the same as on a standard setup. So how much improvement in performance can you expect to see from the Dirtinator versus a modified motor that has a standard armature setup? Well, it's off to the dyno to find out.

TESTING TIME

To prove that a motor with an epoxy-balanced armature is, in fact, more powerful than a similarly equipped conventional setup, we arranged for a little head-to-head armature battle. With help from Neal McCurdy, Trinity's head motor guru, we ran tests using a single Kinwald can and a single 13-turn-triple armature. First we had Neal epoxy-balance the 13-turn-triple armature and test the motor. Then he removed the epoxy and drilled the armature in the conventional manner to balance it.

We used the same can and the same armature so that no variables would be introduced. Both times, the equipment was basically the same, so we could compare results more accurately. Both times, the motor was set up with 4380 brushes and 4033 springs, and it was broken in for 5 minutes before each test and tested in both configurations on a Competition Electronics* TurboDyno 45. The dyno was set to run the motors at 5.20 volts, and the motors were each loaded with 15 to 40 amps in 5A intervals.

As you can see from the dyno results, the rpm went down in the epoxy-balanced armature motor, but there was a 7-percent increase in torque, a 4-percent increase in wattage, and the motor was 4 percent more efficient. Neal explained that drilling an armature and removing metal alters the armature's magnetic mass. This is equivalent to shortening the armature's stack. If you shorten the stack, there is less material in the magnetic field, and the armature produces more rpm and less torque.

So what does this all mean? Is this the new trick motor to be watching out for? Well, in a nutshell, yes it is. Basically, when it comes to electric motors, wattage equals power, and efficiency equals run time. As you can see from the dyno results, the Dirtinator provides more power throughout the power band and more run time! And don't let the name fool you; it isn't designed strictly for use as an off-road motor. As a matter of fact, it should perform well in every form of racing—on-road and off-road. The Dirtinator excels any time you push the limits of power and run-time expectations. So, if you're looking for a little more power to pack into your ride, give the Dirtinator a shot. It rips!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

EPOXY-BALANCED ARMATURE VS. STANDARD BALANCED ARMATURE

	Rpm	Torque	Watts	Efficiency	Amps
Team Kinwald 13-turn triple, modified motor with a drilled armature (constant— 5.20 volts)	28,248	2.5	52 .....	.67	15
	26,701	4.1	81 .....	.77	20
	25,586	5.4	102 .....	.78	25
	24,253	6.9	123 .....	.79	30
	23,071	8.3	141 .....	.77	35
	21,982	9.7	158 .....	.75	40
Dirtinator 13-turn triple, modified motor with an epoxy- balanced arma- ture (constant— 5.20 volts)	27,111	2.7	55 .....	.71	15
	25,869	4.2	81 .....	.77	20
	24,585	6.0	109 .....	.84	25
	23,577	7.4	129 .....	.82	30
	22,661	8.7	146 .....	.80	35
	22,158	10.1	166 .....	.79	40

connector

LESS
LOSS
EQUALS
MORE
POWER

by John Rist

Most professional R/C racers don't use connectors. Instead, they hard-wire the battery, the speed control and the motor. This is a holdover from the early days of R/C car racing, when about the only type of connector that was available for R/C cars was the Tamiya*-style battery connector and bullet-style motor connectors. These connectors are the types still used on box-stock, ready-to-run and entry-level cars. They work, but you get what you pay for. They are very low in cost and are less than ideal from a performance point of view. The main problem with them is that

small connector contacts, and in no time you'll have a connector that is too hot to touch. To further complicate matters, the elevated temperature in the connector cooks the contacts, causing them to oxidize and greatly increasing their resistance. As the resistance goes up, the power wasted in the connector goes up, and the heat goes ballistic until the connector shell actually melts.

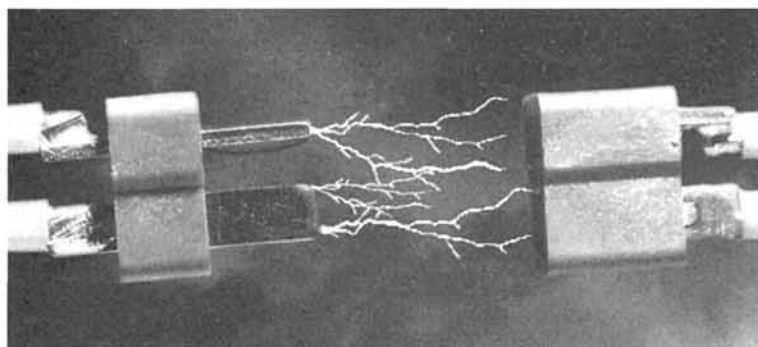
All this said, it's still a pain to hard-wire your battery pack into your car. Hard-wiring a motor is not so bad because you don't remove it after every run like you do your batteries. So I'm constantly on the lookout for connector systems that are convenient and have zero power loss.

FINDING A GOOD CONNECTOR

I've found several connector types that are acceptable for world-class racing efforts. I had both motor and battery connectors onboard my world-record-setting Tornado hydroplane boat. With 8 cells and a stock motor, I had a one-way run of 42.5mph and a two-way average of 39.9mph. Run times for this boat are about 1 minute, so you know the current is ballistic. I had used connectors without fear of power loss because of the research that I had done in the original "Connector Inspector" article several years ago. From the research, I had learned that Sermos/Litespeed* and Astro Flight* connectors had virtually zero loss. That is, they have about the same resistance as the wire they replace.

It's hard to argue with world-class, record-setting connectors. It has been some time, however, since I've run tests on the available connectors. Because manufacturers are constantly improving their products, I felt that it was time for "Connector Wars, Part 2." So, to answer the question, "Who is the king of the connector world," I tested six types of connector:

- Tamiya battery-style connector;
- Bullet-style motor connector;
- Race Prep* connector (green);
- Deans* Ultra Plug (red);
- Astro Flight Zero Loss connector (part no. 4005);
- Sermos/Litespeed connector (red and black halves).



they have very high contact resistance; this is a major problem because we run our cars from a relatively low voltage source (typically 7.2 volts), yet we demand screaming horsepower. Power is a function of voltage and current; with low voltage, you need high current to get high power.

In today's cars, typical current is 20 to 30 amps. This means that with as little as 0.005-ohm resistance in a connector, you will have a 0.15V drop across the connector (voltage = current x resistance or $E=IR$). This, in itself, doesn't sound so bad, but if you have a motor and a battery connector, you would get a 0.3V loss. That amounts to a 4-percent loss in voltage.

Another problem with these types of connector is that they get hot! For instance, a 0.15V drop times 30 amps amounts to 4.5 watts. Dissipate this much power in two

connector shootout

ROUND 2

PRICE VS. PERFORMANCE

We know which connectors performed best under laboratory conditions, but we also found a direct correlation between price and performance. In other words, you pay more for connectors that have lower voltage loss and less resistance. Do you really need the superior performance of the top connectors? That's entirely up to you; just know that, in the field, it's nearly impossible to discern a difference in the performances of the top four connectors. If you can settle for a little less efficiency, you can save some cash.

CONNECTOR	PRICE/PAIR
Bullet-style motor connector.....	\$5*
Tamiya battery-style connector.....	\$5**
Race Prep.....	\$2.50
Deans Ultra Plug.....	\$3.25
Sermos/Litespeed.....	\$3.10
Astro Flight.....	\$6.67

*Tamiya offers bullet-style connectors similar to those tested (part no. 50245). They're sold in packages of six pairs, and they come with plastic sleeving and a crimping tool.

**Tamiya sells this type of connector in "pigtail" form (part no. 50106); they come with bullet-type connectors for the motor and a separate connector and lead for the battery.

THE "SCOPING OUT" TEST

I used the "Scoping Out" lab setup to test the connectors (the same setup used for testing speed controls). To prepare for the test, I wired the connectors in series with pieces of 14AWG wire between each connector. I made sure that all of the solder joints looked bright and shiny so that every connector type had a shot at becoming "Low-Resistance King."

I placed two marks 4 inches apart on my work bench. I used these marks to accurately place the needle probes 4 inches apart when I measured each connector. In other words, I wanted to bridge a 4-inch gap with wire and connector and measure the resistance of this 4-inch-long combination. I could then compare these readings with the resistance of a 4-inch piece of wire to see how close each connector came to having zero loss. With 10 amps of current flowing, I measured the voltage drop and calculated the resistance for each connector/wire combination and for the 4 inches of wire. I then turned the current up to a hefty 35 amps and let the wires and connectors cook for 15 minutes. I then checked each connector for heating. In particular, I checked to see if any connectors were getting hotter than the 14-gauge wire between them. For these two tests, the results were as follows:

35 AMPS

Connector	Voltage Drop	Resistance	Heating
Bullet-style motor connector	0.012 volt	0.0012 ohm	hot
Tamiya-style battery	0.033 volt	0.0033 ohm	very hot
Race Prep	0.013 volt	0.0013 ohm	warm
Deans Ultra Plug	0.009 volt	0.0009 ohm	warm
Sermos/Litespeed	0.010 volt	0.0010 ohm	warm
Astro Flight	0.011 volt	0.0011 ohm	warm
4 inches of 14-gauge wire	0.010 volt	0.0010 ohm	warm

RESULTS

All four of the "racing style" connectors (Race Prep, Deans, Sermos/Litespeed and Astro Flight) came close to having zero loss (the Deans appeared to be even better than zero) and are, therefore, acceptable for racing. The bullet-style motor connector appeared to "have what it takes" as far as resistance goes, but it became hot in the let-it-cook test. Because of the heating, I'm assuming that at the higher currents, the bullet-style connector's resistance went up. This, of course, could start a vicious cycle that would drive the temperature all the way to hot. And as you can well guess, any connector that gets hot, for whatever reason, is *not* acceptable for racing.

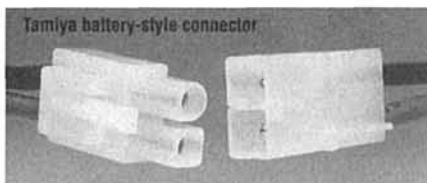
WARNING

It's a fact that the standard battery packs (with 6 or 7 cells) we use every day in our screaming R/C cars are capable of delivering more than 100 amps into a dead short. It's also a fact that you can do this only *once* per battery pack because a dead-shortened Ni-Cd battery gets so hot that it destroys itself. For this reason, don't try at home what I did next. You could get hurt by a fire, an exploding battery, or poisonous fumes.

All the shrink-wrap on the battery pack had burned to a crisp, and the battery had become so hot that it melted the solder joint of the red wire that was attached to it.

DEAD SHORT TEST

The next test I ran was a true dead-short test. I took the daisy-chain string of connectors and plugged them across a fully charged 6-cell, Ni-Cd battery pack. To track the current, I had a current meter connected in the loop. When I first plugged up this dead-short string, the current jumped to 112 amps. Within 15 seconds, the current had dropped to 80 amps, and the smoke began to roll when the current dropped to zero. A troubleshooting session revealed that the Tamiya-style battery connector had become so hot that it melted a solder joint,



became disconnected and melted its shell. I bypassed this connector and continued the test. By 30 seconds, the current was down to 70 amps, and the battery pack was smoking badly. By 45 seconds, all the shrink-wrap on the battery pack had burned to a crisp, and the battery had become so hot that it melted the solder joint of the red wire that was attached to it. This ended the test because the current went to zero. I checked carefully to see whether the wire and connectors had become hot. The Tamiya-style battery connector had become hot enough to cause a serious burn. The bullet connector became hot enough to cause a lot of pain. The Race Prep, Deans, AstroFlight and Sermos/Litespeed connectors and the wire all became equally hot. You could still hold them, but they were uncomfortably hot to hold for long.

WHO WOULD BE KING?

It's obvious that Tamiya-style battery connectors and bullet-style motor connectors

are not—and will never be—suitable for racing. They're fine for entry-level cars that have 8- to 12-minute run times. Their claim to fame is that they're inexpensive to replace when they go bad.

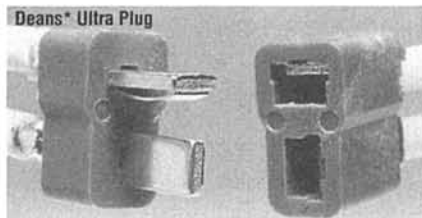
The Deans Ultra Plug came in as the "Low-Resistance King," followed closely by the Sermos/Litespeed and the Astro Flight connectors. It appears that the Deans plug has less than zero loss, the Sermos/Litespeed has zero loss and the

Astro Flight has almost zero loss. The Race Prep connector was a little higher in resistance, but it was still very close to zero loss.

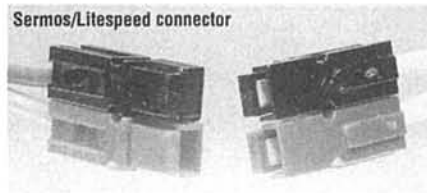
So which connector is best? I think only the user can answer that. What some people consider to be a good feature in a connector, others may consider unacceptable.

FEATURES

• **Deans Ultra Plug.** This is obviously a good choice; it's the low-loss winner. In fact, it appears to have slightly less resistance than the wire it replaced. Also, it was fairly easy to install. The only installation downer is that you must insulate the connections with shrink-tubing to prevent exposed wires from touching the chassis. The plug is polarized, and one lead is marked with a +, which helps set a standard for keeping polarity straight. It does have a male half and a female half, which means it can be used as a battery and motor connector. If you place the female half on the battery lead of the speed control and the male half on the motor leads of the speed control, you can't plug the battery pack into the motor leads of the speed



control. Plugging the battery into the motor leads of an ESC will usually destroy the controller. The positive and negative contacts are mounted in a single housing, which is great if you need these two leads side by side. If, however, you have a split battery pack, such as the type used in a pan car, you may need slightly longer wires to get everything interconnected.



• **Sermos/Litespeed.** Several companies package and sell the Litespeed-style connector, though I believe all of them come from the same connector manufacturer. In fact, the local hobby shop in Huntsville, AL, buys them in bulk from a local electronics supply house and packages them under the hobby shop's name. All the brands that I used or tested were interchangeable with one another and tested equally well. The Sermos/Litespeed connector measured slightly higher than the Deans, but it yielded the same resistance as the wire it replaced; therefore it qualifies as a zero-loss connector. If you've read my columns in the past, you've figured out that this is my connector of choice. I like that the connector pin has a round hole that permits you to slip in a 14-gauge wire and obtain a really good solder joint (one that is mechanically strong and electronically sound).

The Sermos/Litespeed connector system comes as a black shell and a red shell; it's a two-piece, "unisex" connector (both halves are the same). This is the good news and the bad news of this connector system. The good news is that you have complete flexibility in the placement of the connector. There's a dovetail groove molded into each shell half. This groove permits you to lock the shells together in pairs. Put a drop of instant glue on the groove, and the shells become permanently locked together. You can polarize a black and a red shell in two ways. Use one polarization for batteries and the other for motors, and it becomes impossible to swap the two. So what's the bad news? With this much flexibility, there are seven possible ways to incorrectly plug things up to the race track. In fact, it's possible to take the black lead from the battery and plug it into the red lead of the battery and watch it explode; but I've never had such trouble. I always use red for positive and black for negative. My brain and my hand won't permit me to ever plug a black half into a red half. Also, I have all my motors hard-wired, so I can't swap battery and motor leads. I also like the way the connector shell covers up the solder joint, eliminating the need for shrink-tubing on the joint.

Another problem with the Sermos/Litespeed connectors is that motor cleaner

will eat their shells. A little won't hurt, but if you use these connectors on a motor and let the cleaner run down the wires and into the shell, it will fall apart.

• **Astro Flight.** This is the Cadillac of high-performance connectors. It's probably the best-looking, best-made of all the connectors. Its contacts are precision machined and heavy gold plated. All of this accounts for why they work so well and why they are the most expensive of all the connectors

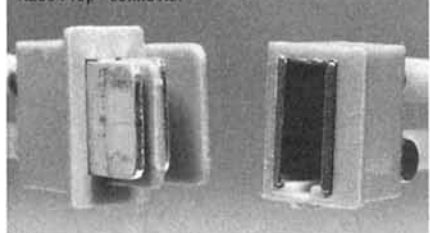
Astro Flight Zero Loss connector



tested. From an interconnect standpoint, they're similar to the Deans. That is to say, they're polarized for positive and negative, and they have a male half and a female half. They also feature shielded pins. As I said earlier, I used them as a motor connector to set a boating world speed record, which says they work well.

• **Race Prep.** This connector is practically identical to the Deans connector, except

Race Prep* connector



that it has slightly higher resistance. So read about the Deans, and you'll have the story on this one.

AND THE WINNER IS...

So who won this round of connector wars? I know who lost! It was the Tamiya-style battery connector and one battery pack. Both of them are history. The winner's circle was shared by Deans and Sermos/Litespeed. Their voltage-loss test results were quite close (Deans did come in lower), but they're different in design. So, pick your own winner based on your requirements and the availability and price of the connector. It's always good to check out what's winning at your favorite racing site.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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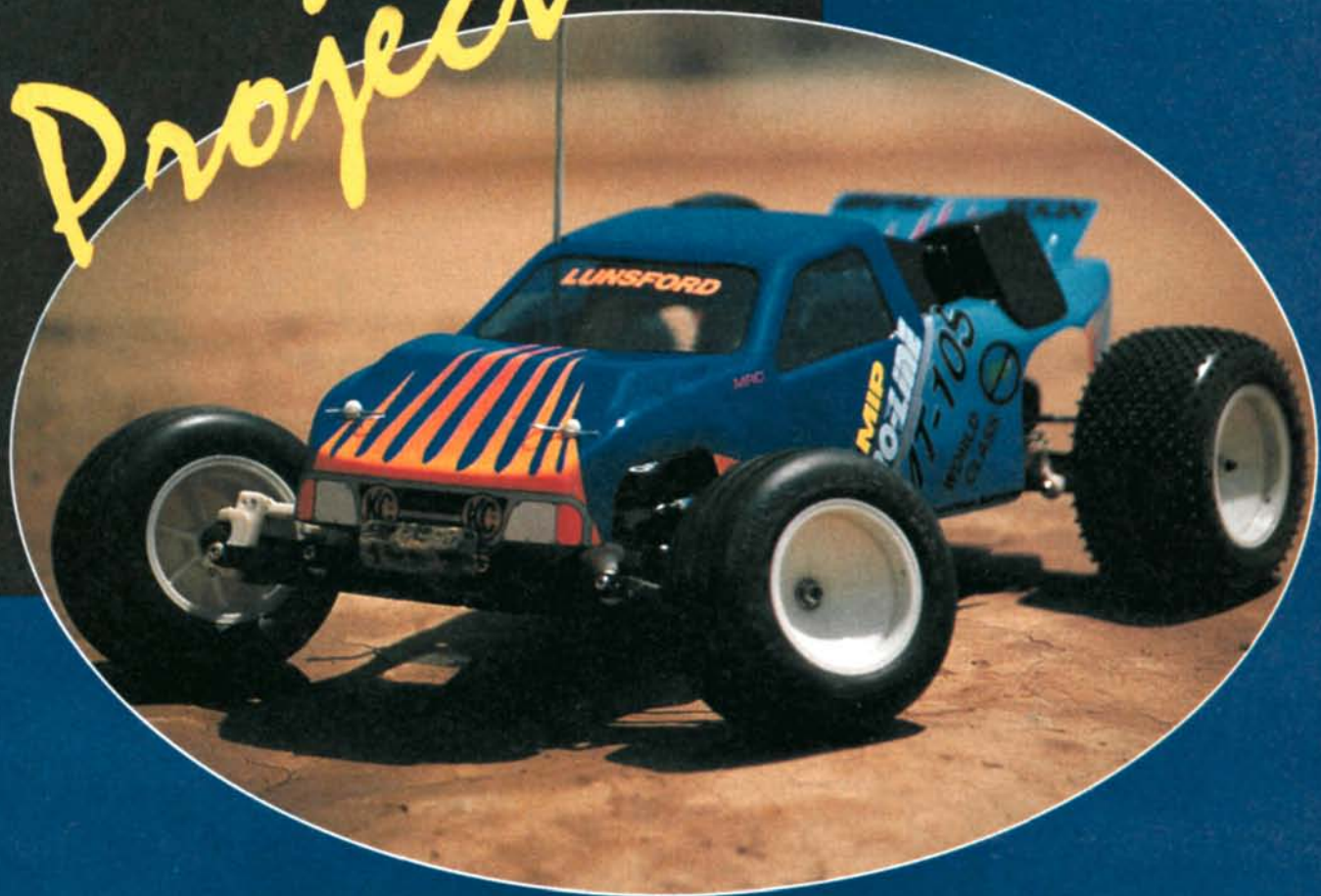
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Project



MRC

by George Gonzalez

MT-10S

Parts-bin pickup

I WAS ONE of the first to test MRC's* new 1/10-scale stadium truck—the MT-10S (see the April '95 issue of *Car Action*). If you have read the story or have seen any of MRC's latest ads, then you know why I was truly impressed with this truck. The MT-10S is loaded with hot racing features, e.g., ball diff, slipper clutch

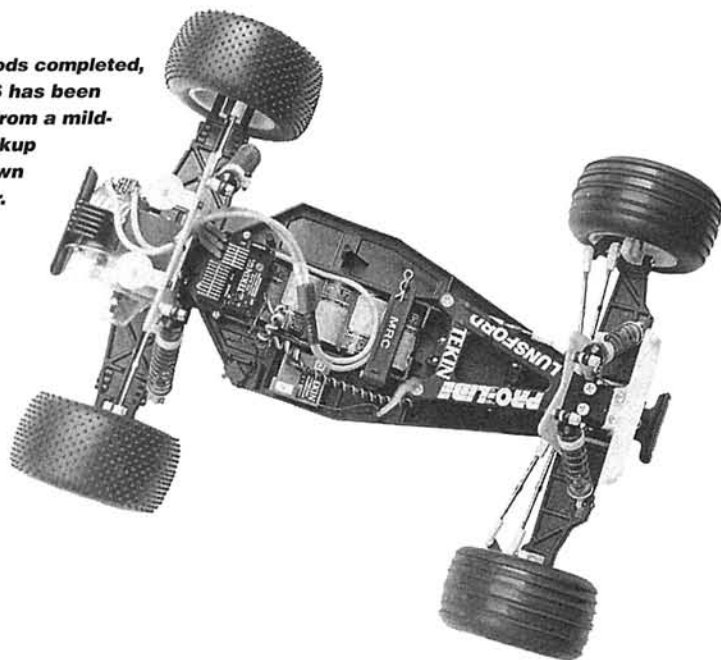
and oil-filled shocks, but its super-low price (around \$100 after discounts) is the most impressive feature. Dollar for dollar and feature for feature, the MT-10S is one of the best entry-level racing trucks on the market. It can also be modified for competitive racing, and this brings us to the subject at hand.

Mods for a Monster



All of the modifications that I used on my Project Truck could be installed on the MRC MT-10M monster truck. I picked up an extra set of wheels from MRC and mounted a set of Pro-Line Masher monster truck tires on them. Next, I painted Dahm's

With all my mods completed, MRC's MT-10S has been transformed from a mild-mannered pickup into a full-blown stadium racer.



BACK TO THE WORKBENCH

I admit that I have gone a little overboard on some of my past projects, so I've decided to keep this one simple and only use aftermarket parts that drastically improve performance and reliability. Also, keep in mind that all the hop-ups I use will work equally well on the MT-10S's monster-truck brother—the MT-10M (see the "Mods for a Monster" sidebar).

HOMIE DON'T "PLAY" DAT

First, I installed a set of MRC bearings (part no. 9426001). Bearings—a major benefit to any R/C vehicle—produce very little resistance (friction) when they rotate. They improve acceleration and top speed, and they require very little maintenance to keep them running smoothly. Bushings, on the other hand, produce more friction when they rotate, and they need constant maintenance to keep them running smoothly.

Commando EXP Ford Explorer body, using Dahm's Pro-Mask kit and Pactra* paint. I also used another front body-mount support from MRC. (I had to cut the original one down to fit the low-slung A&L stadium truck body.)

Now, in minutes, I'm able to convert my MT-10S stadium racing truck into the MT-10M monster truck. I also swapped the Tekin G-12 ESC for a Tekin 610-G reversing speed control (I think reverse is a must for monster trucks.) All the modifications I made to my MT-10S stadium racing truck worked equally well on this version. The huge Pro-Line tires and Explorer body make a stunning beast.

ONE TRICK TRANNY

While the tranny was disassembled, I rebuilt the ball diff. First, I polished the diff rings to a high luster with my Dremel tool, a polishing wheel and a little toothpaste. Next, I gave the diff gear a coat of MIP* diff lube before installing the diff balls. I also replaced the stock diff balls with a set of MIP $\frac{3}{32}$ -inch, super-hard carbide balls (no. LXX-150).

I took the diff-thrust washer assembly apart, soaked it in motor spray and removed the old grease. Then I rebuilt it and applied a liberal amount of Paris Racing* Ronnie Grease to the tiny thrust balls. (I rebuilt the slipper-clutch/thrust-bearing assembly in the same way.) The tranny was then extremely smooth, even when the diff was set tight, so I knew this would mean a noticeable improvement in performance.

SUSPENSION REFINEMENTS

The MT-10S's extra-long suspension arms and extremely narrow front bulkhead are major contributors to its excellent handling. The stock molded shocks, however, are not suitable for serious racing. Hard-anodized shocks are needed to withstand the rigors of off-road racing, so I replaced the stock shocks with a set of Associated's* hard-anodized Team shocks. I used a set of extra-long 1.32-stroke shocks for the rear and a set of 1.02-stroke shocks for the front (part no. 6431—rear; part no. 6432—front).

I decided to try RPM's* new, two-stage shock pistons (nos. 8042 and 8043). Two pistons are installed on the shock shaft, one on top of the other. One piston is stationary, and the other floats up and down. When the

pistons travel in one direction, the floating piston moves away from the stationary piston, and this allows more oil to pass (less damping). The moment the direction changes, the floating piston comes back down against the stationary piston, and this restricts the oil flow (more damping).

When the pistons are installed in the normal position (the floating piston is on top), the maximum damping occurs during shock compression, while the minimum damping occurs during shock rebound. In other words, when the truck comes off a jump, the shocks will absorb the impact with maximum damping, and they will rebound (return to normal ride height) much more quickly. Heavier oils can be used with lighter spring combinations, and that means that the truck can be set up



Pro-Line's Pro-95 Edge front tires in XTR compound with foam inserts handle the steering chores.



Out back, a set of Pro-92, super-sticky, Fuzzie-T tires in Pro-Line's new XTR-M2 compound grab at the track.

PHOTOS BY GEORGE GONZALEZ

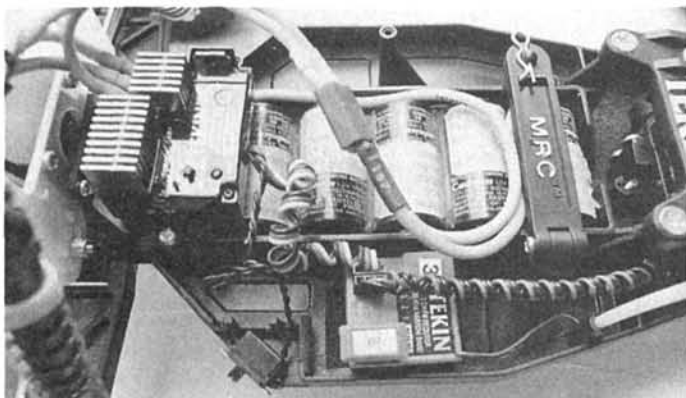
loosely for those low-bite situations and retain adequate damping for the rough stuff. The pistons can also be installed in reverse (the floating piston on the bottom), creating less damping during compression and more during rebound.

I replaced the truck's steering and camber links with a set of Lunsford* Punisher titanium tie rods, which are much lighter than the stock units and twice as strong. They're also cross-threaded for quick and easy toe-in/out and camber adjustments. Lunsford doesn't sell a complete tie-rod set for the MRC MT-10S, but you can buy them individually. Here are the sizes: upper front—2.25 inches; lower front—2.50 inches; rear—2.75 inches. While you're at it, you might want to pick up a Lunsford

Punisher Pro wrench (no. W-102); it makes adjusting camber and toe-in/out a snap.

While I was installing the tie rods, I installed a set of RPM heavy-duty rod ends (no. 7338). These rod ends, or "ball cups" as I call them, help remove play and, because they fit more tightly than the stock units, they won't pop off easily, which is nice to know during race time. They also look pretty cool when on the truck.

I also installed a complete set of MIP BJ



A Tekin TSC G-12 handles the power while a Tekin TFM 3-channel FM receiver grabs the radio waves from my Airtronics Caliber 3P radio. A World Class 6-cell 1700 SCRC battery pack propels the Maxtec 12-turn modified motor.

ball joints (no. 1076) that mate with the RPM ball cups. The MIP ball joints have a slightly larger diameter than the usual ball joint, and that ensures a tighter fit. The balls joints are made of high-quality stainless steel that resists rust, and they're machined to a diamond-like finish. The ball joints also have a flat side on the top of the ball, which actually helps resist breakage. The tight fit of MIP's BJ balls and the RPM ball cups completely eliminate slop from the truck's suspension and the steering bellcrank system.

OTHER MODS

I usually test my off-road vehicles at the Ranch Pit Shop* in Pomona, CA. The slick, hard-packed track demands a sticky tire compound, so I opted for a set of Pro-Line* tires—Pro-95 front tires (The Edge) in the XTR compound and Pro-92 rear tires (Fuzzie-T) in Pro-Line's new, super-sticky XTR-M2 compound. (Yes, I used the foam inserts.)

I topped off the chassis with an A&L* Super BTS ultra-low-profile stadium truck body (no. 9517). Although the body is intended for the Double-XT, it does fit the MT-10S perfectly without any modifications. I did, however, have to swap the stock, rear body mount for a set of Team Associated rear body mounts (no. 7323).

Holes already exist on the rear shock tower of the Associated body-mount system, so no modifications are necessary. I had to cut the front body-mount support in half so that I could lower the body mount and accommodate the low-profile body. (A Dremel tool with a cut-off bit works best for this task, but you could use a hacksaw.)

I used Dahm's* Pro-Mask kit (part no. D821) to prepare the body for painting. The kit includes two 8x10-inch clear masking sheets and a template sheet. You can trace your own designs or the designs from the supplied template sheet onto the masking sheet. Just cut out your design with scissors, and stick it onto the body. The masking material is extremely flexible and sticky, so you won't have any

bleed-through. There are several paint schemes from which to choose, including drips, flames and shock waves.

I also used Dahm's Instant-Tint (no. D814) on the truck windows. The window-tint material is similar to that used on full-size autos, and it's installed in the same manner. It can be applied on the inside or the outside of the body; I prefer the inside so that it doesn't get scratched. The window tint is easy to use: just cut out pieces of the tint material in the same shape as the window, then remove the backing and stick it on. Although the instructions don't mention it, soaking the window-tint material in warm soapy water for several seconds before applying it will facilitate the installation. The win-

dow tint couldn't be any easier to apply, and the results are quite professional.

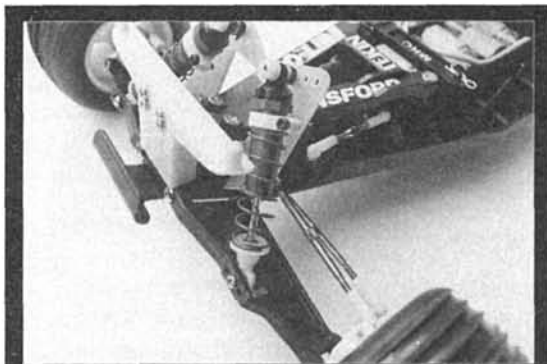
ROCKING ELECTRICS

I used my trusty Airtronics* Caliber 3P radio system and a Tekin* TFM 3-channel receiver. A Hitec* 615MG, high-torque, dual-ball-bearing, metal-gear steering servo with a whopping 110 oz.-in. of torque keeps the front tires pointed in the right direction. A Tekin TSC G-12 ESC manages the power. The G-12 features a super-low 0.00125-ohm resistance and a new, higher-frequency operation (3500Hz). The G-12 also features a simplified Quick Tune setup; external, replaceable, 12-gauge wires; radio-priority circuitry; and an extremely sensitive, adjustable torque limiter. An expertly matched World Class* 6-cell 1700 SCRC battery pack and a Maxtec* 12-turn modified motor complete this rather exotic electronics package.

PERFORMANCE

I made it to the track on a Tuesday morning, and the place was empty. This rare opportunity allowed me to put a lot of laps on my hopped-up MT-10S. It took several battery packs to get the truck tuned just right. I tried different oil/spring/piston setups and shock and camber-rod mounting locations before I arrived at what I felt was the best setup.

I used the RPM "pink"(medium/heavy damping) two-stage pistons with Associated 30W oil and soft blue springs on all four shocks. I mounted each front shock on the middle hole on the suspension arms and the second hole from the inside on the shock tower. I mounted the rear shocks



Team Associated's hard-anodized Team shocks with RPM's new two-stage pistons absorb punishment from every corner of the truck. Lunsford Punisher titanium turnbuckles replace the stock links all the way around.

to the middle hole on the suspension arms and the inside hole on the shock tower. I also changed the locations of the front and rear camber rods. Up front, I mounted each rod end to the innermost hole on the shock tower. At the rear, I mounted each rod end

to the inner hole on the rear hub carrier and to the upper, second hole from the inside on the shock tower.

I ended up using a 16-tooth pinion gear, which gave me a 13.78:1 final gear ratio. With this gearing, my truck dumped at around 4 minutes, 30 seconds, and it had tons of torque. It was performing well, and my lap times were getting faster and faster. The truck had a great deal of high-speed steering with a slight push coming out of the turns; this allowed me to clear the infield with extreme agility. The doubles, triples, whoops and tabletop jumps posed no threat to the truck's excellent suspension, and the



Maxtec 12-turn motor had the truck in the air half the time.

The truck did feel a little twitchy on the high-speed sweepers and long straightaway. Unfortunately, there is no rear toe-in adjustment, which would have helped to remedy this. With a little imagination, one could easily add rear toe-in to this truck, but I didn't have the time to address this problem. Besides, I felt the truck was handling very well and was more than ready to compete.

FINAL THOUGHTS

Overall, I was truly impressed with the performance of my hopped-up MRC MT-10S. Its performance is comparable to that of any pro-level truck I've ever driven, and I'm sure that it could win a lot of trophies. The Tekin ESC, the World Class batteries, the Hitec servo and the Maxtec motor performed extremely well, and they contributed to the truck's awesome performance. I look forward to competing with this truck in the future, so don't be surprised if you see an MRC MT-10S on the starting grid of the A-Main.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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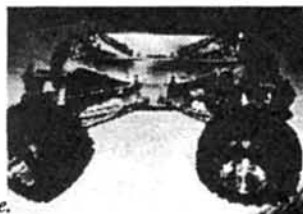
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Brian Page the R/C MTA's second National event held in New York. Joe Kirkwood placed second. Both Clodbusters were equipped with Clod-A-Leaver II chassis & suspension systems. More recently Fred Privett, Jr. won the NR/C TPA's '95 Spring Nationals in the modified dual motor class with his Clodbuster/Clod-A-Leaver II combination. Again Joe Kirkwood placed 2nd with his Clod-A-Leaver II. Clod-A-Levers were the only factory built kits in the top 12 positions. The Clod-A-Leaver II kit fits both Clodbusters and Bullheads and is complete with new long wheelbase ladderbars, cantilever suspension, aluminum chassis, all new steering, extra heavy duty ballends, axle mounted servo and heavy bumper/brush guard. Also included, are Bennett Equipment exclusive front and rear sway bars. The only choice you have to make is 2 wheel steering version at \$225.00 or 4 wheel steer version at \$250.00

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TECH HEAD

by Frank Masi



The shape of a car's body greatly affects its handling. Oval racers in particular use a variety of body styles to tune their car's handling.

Weight equals traction

A car's traction increases in proportion to the amount of weight that presses its tires to the ground. The more weight pressing down, the greater the traction. Gravity and aerodynamic forces determine the amount of weight that presses down on each of the car's tires.

DOWNFORCE

If you follow full-size racing, you've undoubtedly heard the term "downforce" used with talk of wings, spoilers and body panels. Aerodynamic devices such as these channel and direct the flow of air on, around and under a car. Hoods, roofs, tails, wings and spoilers can all be used to

add downforce to a car and increase its traction. Underbody channels that help "pull" air from beneath a car increase traction by canceling lift from underneath the car or even creating a suction effect. The faster the car travels, the more downforce produced, and the greater the weight on the tires.

WEIGHT DISTRIBUTION

The way in which a car's weight is distributed over each of the four tires plays a crucial role in overall handling. If a car's weight is evenly distributed over all four tires, the car will corner equally well in both left and right turns because

both tires on both sides of the car are pressed to the ground with equal force (weight).

But there's one additional factor to consider—weight shifting. An object moving in a straight line (in this case, a car) wants to keep moving in a straight line, and it resists forces that attempt to change its direction. When the car does change course, a force is produced in the direction toward which the car was previously heading. This force causes weight shifting; it's what makes your car's chassis roll in the turns, and it causes its front end to dive during braking. Weight shifting is also why the rear of the car

"squats" and the front end lifts during acceleration.

As the car's weight shifts, traction changes. During cornering, as the car's weight shifts to the outside of the turn, traction increases on the outside tires and decreases on the inside tires. The car's chassis will also tend to lean to the outside of the turn. Extreme weight shifting during cornering can result in a "traction roll" as the shift in weight overcomes the car's center of gravity and flips the car over.

Weight distribution, aerodynamics and tweak are very important to proper chassis tuning. I've only scratched the surface in this column,



As your car body slices through the air, it produces downforce, which can be enhanced with wings. Side dams add side-to-side stability.

WHO NEEDS WINGS?

Never underestimate the influence of aerodynamics on model cars. How frequently have you heard someone say that wings don't do anything on model cars? Ha! Just watch an oval-racing car that has lost its wing do donuts when it enters a turn! Body shape is also critical, especially in oval racing where higher speeds are attained. You'll notice that racers will switch to bodies that produce less downforce over the front wheels (or to bodies with more rear downforce) when they want less steering, and to bodies that produce more downforce over the front wheels when they want more steering.

Sometimes, the car body itself can't provide enough downforce to produce sufficient traction, so the designers must resort to wings and spoilers. In addition to adding downforce, wings can be useful aerodynamic tuning aids that allow racers to make subtle changes in front-to-rear traction simply by moving the wing's mounting position.

TWEAK ADJUSTMENT

Have you ever heard the term "tweak?" At the track, tweak generally means "not flat" and describes a condition in which a car's weight is not equally divided between its left and right sides. As a result of tweak, the car may corner well in one direction but not in the other. Because of this, tweak is undesirable in road-course racing, which has both left and right turns. In oval racing, however, tweak is often added intentionally to improve stability and cornering. A typical tweak setting for oval racing is to make the left, rear tire "heavier" than



On most pan-type cars, a simple, flexing, fiberglass T-plate is used to attach the car's rear "pod" to the chassis. Small screws (shown at the front of the T-plate, just under the shock mount) are used to adjust the car's tweak.

the right. As a result, the right, front tire will also become "heavier." This "cross-loading" creates a force that helps prevent the car from spinning out in the turns.

Tweak adjustments differ according to the type of car and its suspension. To adjust tweak, on-road-type pan-cars that use T-bar rear suspensions usually have adjustment screws that allow you to tilt the T-bar in relation to the chassis. To "tweak" off-road chassis that use independent suspension, adjust the shock's spring collars.

but if you'd like to read more about these topics or have any questions of a technical nature, write in and let me know at Tech Head, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897; e-mail: frankm@airage.com.

ADVERTISEMENT

TEAM LOSI TECH TALK

INVEST IN GOLD AND SILVER

Team Losi tires are more popular than ever before. It seems that winners worldwide are choosing Team Losi tires in both Gold and Silver compounds to drive to the winners' circle. In fact, at the most recent Florida Winter Championships, Team Losi tires found their way onto more than 75 percent of the A-Main cars in all classes. Then, in the first leg of the British Grand Prix, Team Losi tires finished ahead of the competition, taking the top three positions. In the second event of that prestigious series, Team Losi tires were on all 10 A-Main cars; in fact, the tires were used on 95 percent of the cars entered. Team Losi tires were also used by the winners of the Australian Nationals. This just goes to show how versatile Team Losi tires really are. They work well in virtually any conditions. If you haven't tried them yet, maybe you should.

A NEW ANGLE ON STEERING

Team Losi has just released new steering parts for both the Double-X and the Double-XT. They improve the vehicles' steering geometry and ensure a more consistent, smoother steering response. These new, adjustable parts offer a choice of two mounting locations for the tie rods. The Team Losi drivers used these new pieces to steer their cars and trucks to victory in such races as the Reedy Race, Florida Winterchamps, Cactus Classic—and more. They're available now, so check your local hobby shop for availability. Ask for part no. A-1602.

LESS DRAG

Here's a simple way to decrease drag on the Double-X and Double-XT transmissions: remove the blue bearing shields that are next to the outdrive bearings. The shields were designed to protect the bearings and transmission from sand. This was also the first time that Team Losi had used a Teflon-sealed bearing such as the ones on the outdrives. The truth is that these bearings are so good that the blue shields just aren't necessary. However, if you run in a really, really sandy area, leave these shields in place—just to be safe!

* * * * *

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

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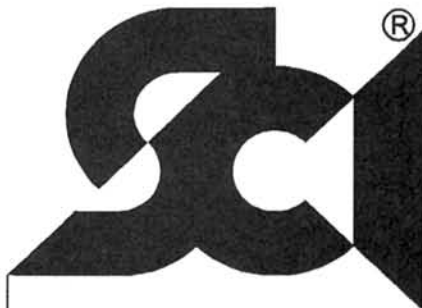
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From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

RACING

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



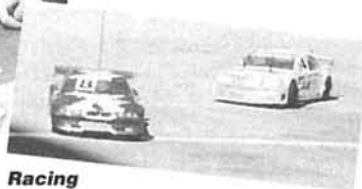
Racing got a bit messy during the Rookie Gearbox Class.



"Lot" of Fun

From rookies to experts, everyone had a chance to enjoy the day at the La Habra Hobby Shack parking lot race.

Tim Price helps a father/son team repair their F1 car—a free service offered by Hobby Shack for all racers.



Racing action at its best.



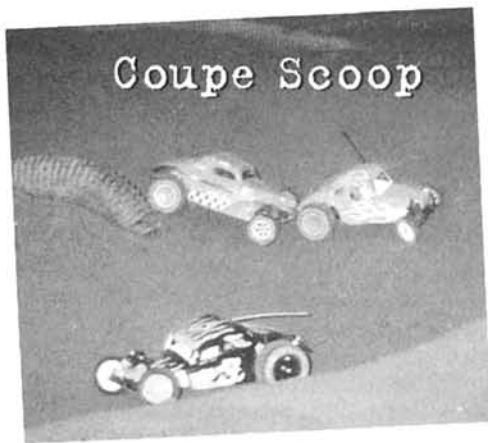
Racers anxiously await their turn to take the track.

These are just a few of the entrants from the NR/CTPA 7th Annual Winter Superpull in Erie, PA. All of the trucks came prepared for the weight-pulling battle. Weights started out at 80 pounds and, by the end of the day, the trucks were trying to pull up to 550 pounds.



Pullin' Their Weight

Coupe Scoop



Josh Alvey wrote in to show us the action in the new off-road "Coupe Class" that races at Marty's R.C. in Bradley, IL. This class features buggy-style chassis with step-pin truck tires in back and car tires up front; Trinity Procar stock motors; and 1930 to '41 coupe bodies.

call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

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Kyosho R/C Sport Racing

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ext. 085F

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(714) 964-8846

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(402) 434-5050

Trinity's Street Spec Series

(908) 862-1705

INDOOR R/C GAS CAR RACING IN DETROIT!

by Mike Myers



Here's the drivers' stand and the extra-sticky track, which was a challenge for all.

One way to get people interested in racing R/C cars is to put on demonstration races in a public place where you will attract lots of spectators. The Detroit Radio Control Car Club has found a way to do just this. The big Detroit Autorama show is held every February in Cobo Hall—a large exhibition hall in downtown Detroit. The Autorama features full-size custom cars, dream cars, restored classics and race-cars. This year, the Detroit R/C club made arrangements to hold demonstration R/C gas-car races, which became the highlight of the show!

In the Midwest, the outdoor racing season doesn't start until late April or early May, so many local gas-car enthusiasts from both the Detroit club and the nearby Toledo gas club were excited about getting an early opportunity to race their cars. The people in charge of the Autorama provided a reasonable amount of floor space on which to set up the track. The club's trailer, which holds all the boards and hardware needed to construct the track, was unloaded and fixed at the appropriate spot to become the drivers' stand. The club also brought in a loudspeaker system, tables and chairs,

the AMB race-scoring system and all the other odds and ends that are needed to run an R/C race.

The club set up a row of boards all the way around the track, then they put up some "sawhorse" barriers to keep the spectators back. Within these boundaries, the club was able to create a fairly interesting roadcourse track with some tight turns, some even tighter turns and some very, very tight turns. There was even a short straightaway. When the track had been laid out, a coating of VHT (a traction-providing compound) was sprayed onto it. The club also set up a table outside the barriers where spectators could come ask about the cars and R/C racing. Finally, they were ready to run!

ALL FIRED UP...AND THEY'RE OFF!

If you've ever seen an 1/8-scale on-road gas race, you know how exciting they can be. Not only do they look exciting, but they also sound exciting! Every time the cars fired up and went out on the track, a crowd formed. The more cars there were on the track, the louder the noise and the bigger the crowd! Roughly every 10 minutes, a group of cars would go out and warm up

for a few minutes and then have a 5-minute race.

Meanwhile, back at the AMB system, the club organized these demonstration races just as if they were regular, scheduled, outdoor club races. They ran several rounds of qualifiers, organized the results, set and ran the Mains, and all of the winners earned club points.

You might wonder what it was like to race 1/8- and 1/10-scale gas cars indoors like this. On Friday, the track was extremely slippery. I thought this was great because my *Serpent* was set up for that kind of surface, but most of the other cars spun out and did other unsociable things. So, dur-

smallest (and otherwise, most useless) tires he could find. Even though the track was small and sticky, it was a lot of fun to drive on. It wasn't very conducive to speed (my 2-speed never shifted into second gear), but it was still challenging.

The club did everything it could to generate good publicity for R/C cars and racing. They had a raffle at the information table and hung a large banner, and the race announcer broadcast basic information about the cars on the track. Michael Collins, from the WJBK Fox TV-2 local news team taped interviews with club members, and he also had a go at racing. He had the club set up a typical race, which he taped and commented on. The next morning, the race was featured on the "TV-2 Eyewitness Morning Show." Mike Collins and his cameraman did a great job; the cars looked and sounded as great on TV as they had at the track.



Mike Collins and the WJBK Fox TV-2 news team interview the drivers—stardom!

ing a break in the action, the club sprayed a second layer of VHT traction stuff on the track.

But things didn't work out as planned. A few hours later, most of the cars were doing traction rolls at the slightest provocation. Rick Davis, the club president, conquered the track conditions by using the hardest,

Overall, the weekend went really well. The club earned enough money to fix up the track boards, and the racers got some midwinter practice.

If you'd like more information about the Detroit or Toledo clubs and their schedules, give me a call at (313) 994-5255 (Monday evenings).

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Send ad and payment to: Classifieds Ads, Elise Silkowski, Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897; or, for more information, call (203) 834-2339.



CHRIS'

BACK LOT

A Simple fact Dies Hard

This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897.

...you absolutely do not need expensive goodies to be competitive.

Just the other day, *Car Action* executive editor Frank Masi came into my office and said, "Chris, did you know we're still getting letters about a feature you did in the August '91 issue called 'R/C Facts and Fallacies'?"

I said, "Wow, I forgot all about that piece." Frank said, "Exactly my point! Many others probably forgot, too. I think you should revisit that topic." Frank is right; it's a topic worth repeating, so for the sake of the forgetful and new readers, here I go again.

The premise is simple: you don't need a graphite chassis, a titanium steering linkage, a \$200 electronic speed control, or a \$130 steering servo to win races. In fact, if you depend on such equipment to put you in the A-Main, in my opinion, you should quit now. Many novice racers get frustrated and annoyed and quit the hobby because they've spent hundreds of hard-earned dollars on exotic parts only to find out this doesn't buy them faster lap times. The really tragic part is that they leave the hobby believing they needed to spend more! This is the unfortunate result I want to avoid.

I don't want you guys to quit the hobby. I do want you guys to understand that you



absolutely *do not* need expensive goodies to be competitive. Want proof? Doogie, Frank, John and I all race stock Tamiya 4WD sedans with the same motors and batteries. Doogie also built the highly modified, expensive Tamiya car you see pictured here next to a stock version of a similar chassis. Each of us has tried the modified car and—guess what?—the "super car" with the same motor and batteries as the stock cars has never given any of us a major advantage.

...if you depend on equipment to put you in the A-Main, quit now.

The stock versions do just as well as the modified ones. Even with the expensive hop-ups, there was no major difference in performance.

Now, before you aftermarket manufacturers get all upset with me, let me say these beautifully made components do have their place. For example, you can tailor a car to your personal driving

style with one-way bearings on the front of your Tamiya 4WD sedan. Here's another good one: machined-aluminum steering bellcranks riding on ball bearings with titanium ball links will tighten the steering. Will they turn you into a consistent winner?—so sorry, not a chance. Only practice can do that. Also, for those who simply love to customize a car into a real showstopper, parts such as hard-anodized purple or gold A-arms sure do make a car stand out in a crowd of stockers. When it comes to performance, however, expensive parts do not a great driver make.

You can be extremely competitive with a stock chassis setup; that's a fact.

You can be extremely competitive with a stock chassis setup; that's a fact. Today's cars are well-designed and come with many hot hop-up items. This is truer today than it was in August '91 when I first shot my mouth off on the subject. Frank, thanks for reminding me how brilliant I am. ■

Here's a new section for Net monsters (those who love the Internet). Each month, I'll pick an Internet message I like and print it here in the "Lot's Net Monster," which is now part of "Back Lot." To my pontificating pals, I say only this: keep them short!



From: JON9378329@aol.com
TO: chrisc@airage.com

Hi Chris!

How was your "vacation"?

I'm a very big fan of RCCA and I think that your back lot is one of the best parts of RCCA as soon as I get my issue in the mail I open it up backwards just to see what's new in the back lot. I particularly liked the back lot in the may '95 issue with the your top ten coolest. Oh yah I like your dog luna doesn't she mind those antlers? Tell your girl friend/wife/friend or whoever she is that I think she's pretty (she was on the bike with you).

Thanks a lot!!!!!!

Please e-mail back and tell your "friend" I think she is pretty!
later,
Jonny! or jon9378329@aol.com

Answer to Jon: she is pretty isn't she. She's French, and her name is Brigitte Peugeot. Anything else is nobody's business; no offense. One of Luna's highest doggy duties is to pose for our Christmas photos as a "reindog." She doesn't mind; she gets cookies! Thanks for the message, Jon.

CC